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Event and Comment.

Rural Development in Queensland.

AS set out in the Opening Speech of His Excellency the Governor, many important proposals bearing directly or indirectly on the welfare and progress of rural industry are listed for consideration in the course of the present Session of the Queensland Parliament. Following is a summary of the matters to be submitted:

Although the necessities of war are of paramount importance, much attention is to be given to plans in preparation for the difficulties which will surely arise when the war is over. The possibilities of development in this State are very great, and the experience gained in the hard school of war is being applied in the work of the departments directly concerned with the tasks of rehabilitation and construction.

A new scheme for subsidising many types of the works of the various local bodies has been adopted. Under the new subsidy scheme, rates ranging from 15 per cent. up to a maximum of 50 per cent. on capital cost (or the equivalent in annual interest and redemption charges) will be available for approved capital works. The existing subsidy scheme of 50 per cent. for mosquito eradication and malarial control will be continued. A variable schedule of rates has been designed to ensure that the new subsidy proposals will provide the greatest possible measure of assistance to the most essential public utilities, including the acceptance of a new principle of subsidising certain electrical works, such as extensions into the rural areas and the inter-connection of power systems between widely separated areas. New subsidy proposals in regard to water conservation and irrigation schemes have been adopted under which, in the case of head works construction, the State will bear from 50 to 100 per cent. of the cost, and in the case of local weirs from 25 to 50 per cent. of the cost.

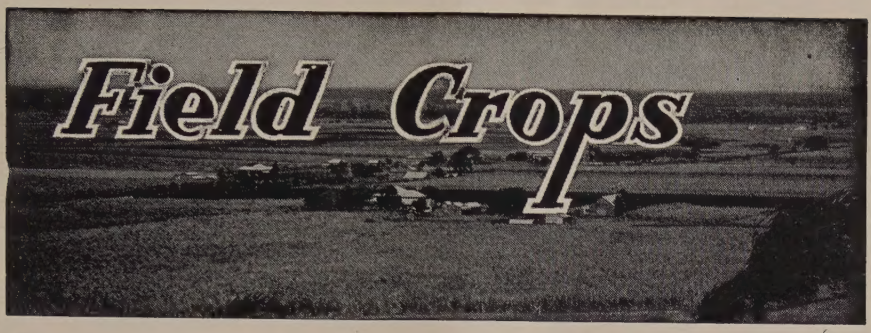
The State Electricity Commission is preparing plans for the post-war period, and it is proposed to introduce legislation to enable the carrying out of a properly planned and comprehensive programme of electrical development throughout the State.

A Bureau of Investigation has been constituted, under *The Land and Water Resources Development Act*, and is proceeding with its investigations, the immediate purpose of which is to prepare for the anticipated heavy demand for land after the war. The construction of a very considerable number of weirs in the watercourses of the State and the provision of subsidiary waterworks are contemplated under the general plan. Advance allocations of finance have been approved for water conservation and irrigation projects. Such works will be administered by irrigation and water supply boards constituted under the Act, a proportion of the cost being chargeable to the Boards as a loan. It has been necessary, as an indispensable preliminary to forward planning, to assess for a number of years ahead, the probable amount of funds to be available annually for public works, together with a preliminary allocation between various purposes of these estimated financial resources, to serve as objectives within which schemes may be surveyed and planned with some certainty of final construction. As a result of this survey, it is anticipated that an adequate amount will be available for expenditure on works and development in the first five post-war years, including some £6 million for maintenance and renewal of railways, roads, and other public assets to which it has not been possible to devote the required attention during the war. Reserve Funds under *The Post War Reconstruction and Development Trust Fund Act* have been established, so that at the termination of the war, or even before, if found necessary, and as labour and materials become available, there may be immediate implementation of the programme. At the 30th June, 1944, £8,420,000 stood to the credit of the Fund.

Transport problems also are to receive close attention. While, undoubtedly, there will be much expansion in other forms of transport, goods carriage on road, rail, and sea will long continue to predominate. Rail and road transport are collaterals, consequently there should be close co-ordination of these sections in the interests of efficiency, economy, and community service. In respect of arrangements for passenger traffic by road and auxiliary means, a measure of decentralised management in matters of purely local concern, subject to general supervision and control by the central authority is favoured.

Food production must continue as an increasingly important factor in Australia's war effort and Queensland, in common with other States of the Commonwealth, is making and must continue to make a substantial contribution to Allied food supplies. A high volume of food production will also be necessary in the post-war period in fulfilment of obligations in respect of the feeding of the peoples of the liberated countries. The State Government is co-operating wholeheartedly with the Commonwealth Government in its efforts to meet local civilian, Service, and overseas demands.

Among the new measures to be introduced in the course of the Session are a Co-ordination of Rural Advances and Agricultural Bank Acts Amendment Bill; a State Electricity Commission and Electric Light and Power Acts Amendment Bill; a Stock Routes Improvement and Animal and Vegetable Pests Destruction Act Amendment Bill; and a Valuation of Land Bill.



Green Manures in the Tobacco Crop Rotation.

R. C. CANNON, Instructor in Agriculture.

IT has been the experience of tobacco farmers in North Queensland that they invariably obtain the best results from newly-cleared, virgin land. As successive crops have been grown there has been, despite increasingly heavy applications of artificial manures, a progressive decrease in yields coupled with a corresponding falling off in quality. This experience is by no means restricted to tobacco growing in the tropics, but is common to all types of farming under varying climatic conditions. There is no doubt that this condition is accentuated in tropical areas for reasons which will be outlined later. Soils which behave in this manner are popularly described as "played out." What is the cause of this condition, and what can the farmer do to overcome it?

Soil fertility is bound up very intimately with the organic matter in the soil, which is derived from the decay of plant and animal residues and is commonly termed "humus." There are several aspects of soil humus which have special application to sandy tobacco-growing soils. These include the effects of humus on the availability of plant foods and on the physical condition of the soil, and the relationship of humus to nematode populations.

Effects of Humus on Availability of Plant Foods.

The importance of humus in the production of good quality tobacco leaf must be emphasised. To a large measure this factor of leaf quality is bound up with the availability and continuous supply of nitrogen in a form in which it can be assimilated by the growing plant. The mere presence in the soil of nitrogenous compounds does not necessarily satisfy plant requirements. Plants require certain specific forms of nitrogen for their nutrition and it is in the continuous supply of these compounds that soil micro-organisms play an important part. In the sandy soils of the tobacco areas these microbes are important whether the nitrogen supplied by manures is organic material or in the form of nitrates.

In the soil, organic substances undergo a series of changes and the nitrogen is easily liberated in a form in which it can be taken up by plants. This process of nitrogen liberation is brought about by the activities of many types of micro-organisms, all of which thrive under conditions associated with abundant humus. Dried blood is commonly

the source of part of the nitrogen supplied in artificial fertilizer mixtures designed for use on tobacco grown on sandy soils, since it is broken down gradually, thus yielding a steady supply of nitrogen to the plants.

A part of the total nitrogen of a tobacco mixture is provided in the form of nitrates, usually nitrate of soda, so as to give some immediately available nitrogen for the transplants. In this form it is readily available for plant growth, but much may be lost through leaching by rains. In the case of well-drained sandy soils subject to heavy rainfall nitrates not immediately utilised by the plant may frequently be lost in this way. The presence of an abundant supply of humus in the soil results indirectly in the retention of the nitrate—the micro-organisms which feed on the humus take up the nitrate and ultimately release it as they die.

Effects of Humus on the Physical Condition of the Soil.

Soil is made up of particles varying in size from coarse sand to the finest clay. When soil in good tilth dries or is handled it breaks up into crumbs composed of soil particles loosely cemented together. Between the crumbs and within the crumbs themselves are minute pore spaces occupied by air or water, both of which are vital to plant life. As these crumbs break down so the soil particles become more and more closely packed together, thereby reducing the air- and water-holding capacity of the mass. Normally the cementing agent may be clay or humus, or both. Humus produces a loose, spongy structure which has an enormous capacity for absorbing moisture. Where clay is the principal cementing agent the structure is less spongy.

North Queensland tobacco soils contain a relatively small amount of clay and their humus content is equally low. Even virgin soil does not

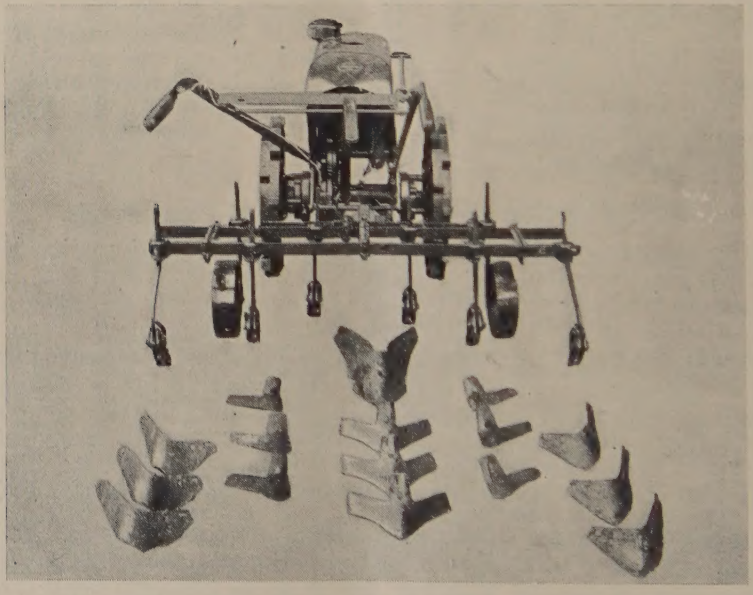


Plate 36.

SIMPLICITY GARDEN TRACTOR.—Attachable equipment. Mounted on the cultivator frame are adjustable standards for depth and spacing and on these standards various tool points—tines, duckfeet, weeding hoes, and furrowers (as shown)—are attachable.

exhibit a particularly good crumb structure and continued cropping and cultivation tend to reduce the soil to a condition in which even a light shower will tend to cause a "caking" of the surface, a condition with which most tobacco farmers are only too familiar. This crust seriously interferes with aeration and considerably reduces the capacity of the soil to absorb water quickly. This means that much of the rainfall does not penetrate the soil but is lost through surface run-off. The early rains in the northern tobacco areas are so sporadic that growers can ill afford to lose any of the moisture which they should add to the soil. No amount of cultivation in itself can entirely overcome these adverse effects, but they can be mitigated by the addition of humus to the soil.

Another point to be considered is the relationship of soil structure to the incidence of soil erosion. It is only when soil is unable to absorb rainfall as fast as it falls that surface run-off occurs to produce erosion. This capacity of a soil to absorb rainfall is determined by the pore-space, which itself is determined by the extent of aggregation of the composite soil particles. The formation of a surface crust referred to above renders the soil incapable of absorbing much of the rainfall as it is precipitated and the surface run-off carries away quantities of the loose soil particles.

Relationship of Humus to Nematodes.

As mentioned earlier, the presence in the soil of organic matter favours the activities of micro-organisms. This applies to many species which live at the expense of harmful organisms, such as nematodes. There are many species of fungi which have become adapted to the capture, and ultimate destruction, of soil nematodes by the development of special trapping devices. In addition there are a number of free-living nematodes which are not parasitic on plants but attack other

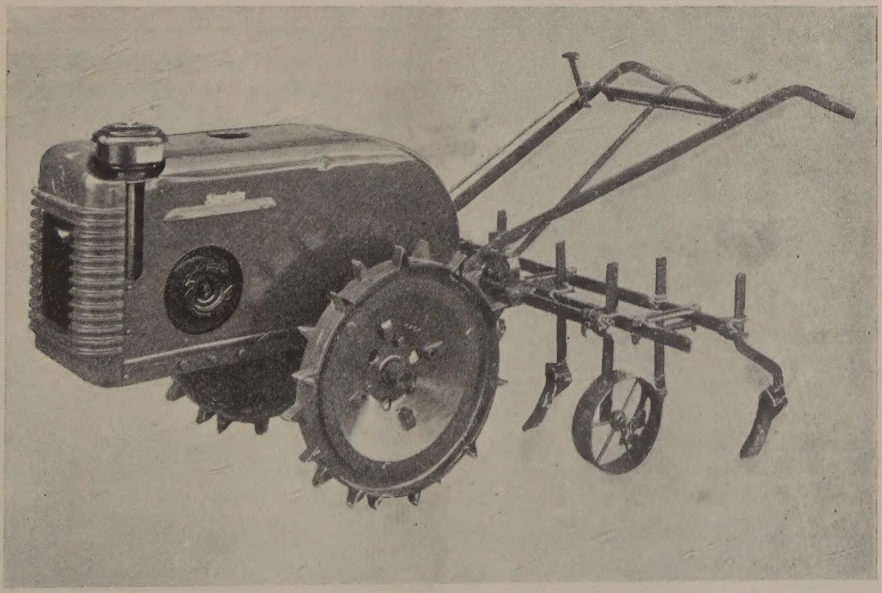


Plate 37.

Simplicity Garden Tractor.—A machine new to Queensland. Units powered with a 3-h.p. engine, complete with attachments, are available for immediate delivery (£131 15s. f.o.r. Brisbane). See also Plates 36 and 38.

nematode species, including the species which is such a serious pest of tobacco. Due principally to the activities of these different groups of organisms the presence of decaying organic matter in the soil has been shown to decrease the population of plant-parasitic nematodes.

Humus in North Queensland Tobacco Soils.

Tobacco in North Queensland is grown on relatively poor, sandy soils supporting an open forest. Even virgin soils are typically low in humus, for the natural vegetative cover is comparatively sparse, hence there cannot be a particularly large volume of organic remains being added to the soil surface. At the same time the sparse vegetation exposes the soil to the heat of the sun's rays. This means that the soil temperature is maintained at a fairly high level for the greater part of the year and for many hours of the day. Evidence from many parts of the world indicates that humus decomposition is favoured by high soil temperatures which accelerate the activities of the soil micro-organisms. Apart altogether from the activities of these microbes there is the further loss of humus-forming materials brought about by the annual recurrence of grass fires.

It is obvious, furthermore, that conditions associated with cultivation, necessary though it is, must accelerate the natural depletion of humus reserves. Once the land is cleared of its natural, protective vegetation the effect of the sun's rays become greater. Admittedly, some protection may still be afforded by the growing crop, but the land is exposed for a long period between successive crops. The lack of a reliable winter rainfall in the tobacco areas of North Queensland, unfortunately, makes it very difficult to provide a winter cover crop other than the natural grass and weeds.

All of these factors make it imperative that a far-seeing farmer should seriously consider what means are at his disposal for the main-

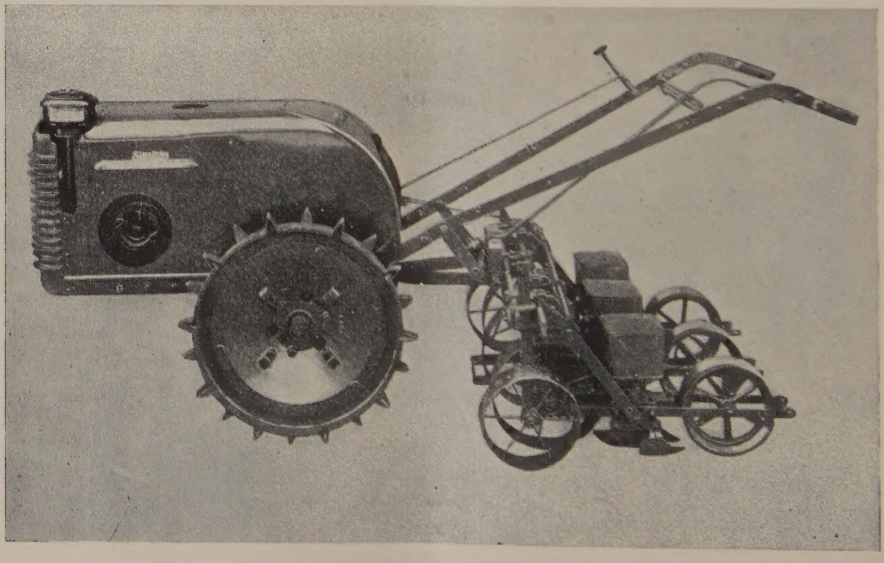


Plate 38.

SIMPLICITY GARDEN TRACTOR.—The sowing attachment comprises three seed boxes bracketed with a frame attachable to the tool bar and adjustable to different widths as a 3-row seeder.

tenance of an adequate reserve of humus in the soil. The time has gone when even the short-sighted farmer can think of planning on the basis of clearing new land each year, as quite a large proportion of the virgin land on farms has already been exploited. Replenishment of soil humus may best be done in the tobacco areas by ploughing in suitable green manure crops.

Green Manures in the Tobacco Rotation.

In determining the type of green manure to be grown many factors have to be taken into consideration, chief among which are the following:—

(*a*) Type of green manure, e.g., whether legume or grass;
(*b*) Suitability of green crops to soil and climate;
(*c*) Period of maturity of green crops;
(*d*) Susceptibility to nematode attack; and
(*e*) Ease of handling and labour involved.

Too high a proportion of organic material of a high carbon content is undesirable, and this points to a legume as the most desirable type of green manure, though it is possible that a legume in combination with a grass may also be of advantage. If only one type of green crop is to be included in the rotation it should undoubtedly be a legume. In view of the rainfall distribution in northern tobacco areas the crop selected must be quick maturing—it is essential that the green crop be ploughed under while the soil is still in a moist condition after the monsoonal rains, otherwise decomposition will proceed too slowly. In view of the seriousness of the nematode problem, any crop selected should possess a relatively high degree of resistance to nematode attack. It would be foolish to include in the rotation a crop which is highly susceptible to nematode attack and which would, therefore, breed up the pest. At this stage in our knowledge we cannot assume that the process of decay of organic matter would so reduce the nematode population of the soil as to permit us to deliberately breed the pest in a crop designed to reduce the soil population. Hence it is considered that a green crop known to be susceptible to nematodes should be avoided.

The last point is very important. It is recognised that the growing of a green manurial crop does cost something in cash and valuable time and labour. The value of a green manure is reflected in the increased crop returns of the subsequent tobacco crop. If a cash return can be obtained from such a rotational crop so much the better, but this should not be the determining factor. A quick-growing crop is always less costly to handle on account of the fact that weed competition becomes of minor importance and cultivation costs are thereby reduced. Such crops can usually be sown broadcast and cultivations omitted altogether.

With the object of determining the most suitable green manures, and the most suitable types of rotation, for tobacco in North Queensland long term experimental work was inaugurated three years ago at Mareeba. Despite complicating wartime conditions this work has been continued and the first set of data will be available from last season's crop. This will be supplemented by data in each successive year, and as this accumulates this Department will be in a better position to make more definite recommendations as to tobacco crop rotations. In the meantime suggestions may be made, although these may have to be

amended in the light of further experimental evidence. For the guidance of farmers a number of possible green manure crops suitable for North Queensland will be discussed separately hereunder.

Peanuts.—Peanuts are only very slightly susceptible to attack by plant-parasitic nematodes and may with safety be included in a tobacco rotation. They do not yield an exceptionally heavy body of greenstuff, nor do they provide a perfect soil cover. On account of weed growth it is necessary that provision should be made for one or two cultivations during the earlier growing period. In order to provide as good a cover as possible they should be sown in rows as close together as cultivation implements will permit. For the best results the crop should be ploughed under just before maturity and before the foliage begins to die. Normally this stage should be reached soon after the conclusion of the monsoonal rains and before the soil has dried excessively. If left too late undecayed kernels may be troublesome. Some may germinate among the tobacco crop while others will be attractive to bandicoots, which may disturb many tobacco plants as they dig in search of the buried "nuts." Some farmers fear that the ploughing under of a crop of peanuts may so enrich the soil with nitrogen as to adversely affect the quality of the tobacco leaf. Provided the crop has been ploughed under while the soil is in a moist condition favourable to the decomposition of the organic matter and followed by a fertilizer mixture relatively low in nitrogen, this has not so far proved to be the case. Growth has been more vigorous and the leaf has tended to be heavier and darker, but not excessively so.

Velvet Beans.—This legume, also, is relatively resistant to root-knot nematode attacks. It can provide a large body of green-stuff and provides an excellent soil cover. It is usually grown in rows with maize, which acts primarily as a support. The inclusion of maize is not altogether satisfactory, as a proportion of the broken stalks may not be sufficiently decomposed before the subsequent tobacco crop is planted. The broken stubble can be very troublesome during planting out and subsequent early cultivations. Probably a less sturdy supporting crop would be preferable, or it may even be omitted altogether. This crop does not reach full maturity before the end of the monsoonal rains and it is in good condition for turning under soon after the rains have ended.

Crotalaria goreensis.—This legume has been selected on account of its relative immunity to nematode attack and its suitability for broadcast sowing. It has one distinct disadvantage in its slow growth in the earlier stages, whereby weed growth is able to seriously compete with it. In addition, the germination is not good, and further accentuates this fault. There is some evidence, however, that better results might be obtained by allowing the first rains to germinate a proportion of the weeds, which can be destroyed by cultivation before the sowing of the Crotalaria seed. Even where weed growth has appeared to have been excessive, later growth in the Crotalaria has been observed to have eventually smothered the weeds. Under good conditions the crop may attain a height of 5 to 6 feet and provides an excellent cover and a good body of green material. When some of the abovementioned difficulties can be overcome this legume may supersede others so far tried.

In South Africa another species, Crotalaria juncea, has been used with some success in the tobacco rotation. It may well be that others

of the many species of Crotalaria may later prove to be better suited to our requirements.

Cowpeas.—A number of farmers have tried this legume in a tobacco rotation, but the results have been very conflicting. However, in view of the high susceptibility of local species to nematode attack, it is considered undesirable from that point of view alone. The Iron variety of cowpea, which is well known in the United States of America, is reputedly resistant to nematodes. This variety has not yet been tried in the tobacco areas but may prove satisfactory.

Sudan Grass.—In the absence of other sources of organic matter it is considered that too high a proportion of carbon would be added to the soil, thus immobilising too large a part of the otherwise available nitrates. Information so far available points to this conclusion and results following this grass have been disappointing. It possesses many of the desirable qualities outlined earlier—it is easy to grow, it can be sown broadcast, and it grows rapidly and is able to smother weed growth—and there is reason to believe that it may have a definite place in the tobacco rotation following, or perhaps preceding, a legume.

Briefly, there are three main reasons for including a green manure in the tobacco rotation:—

(1) To improve the general fertility of the soil, which will be reflected in improved leaf quality.

(2) To improve the soil structure so as to absorb and retain the maximum amount of the natural rainfall, with a consequent checking of soil erosion.

(3) To reduce the losses brought about by nematode attacks in the tobacco crop.

Broadly speaking, any green manure will be better than none at all. Farmers would be well advised to immediately plan for the inclusion of a green manurial crop in their rotation, selecting their crop in the light of the preliminary information supplied above.

Plate 39.
When the Rain Came.—Jimbour Plain, near Dalby.

Crop Rotations for Farms in Cotton Districts.

W. G. WELLS, Director of Cotton Culture and Senior Research Officer.

THE bulk of the cotton crop grown in this State is planted in districts which receive an average annual rainfall of less than 30 inches. The more important of these districts are the Dee and the Don Valleys adjacent to Wowan, the Dawson Valley, the Callide Valley, the Upper Burnett, the western half of the Central and Southern Burnett, the Northern Darling Downs, and the Northern Maranoa.

The rainfall in these districts is variable but approximately 25 per cent. of the year's total occurs during August, September, and October, 50 per cent. during November, December, January, and February, and the remainder in the rest of the year. October is usually the wettest month of the first period, January or February of the second period, and March of the third period, although June is a fairly reliable month for soaking rains.

Owing to the general similarity of the climates and soils in these districts, the same crops can be grown in all of them. These include wheat for grain and grazing in the last two districts and for mostly grazing in the others, oats for grazing and some hay, grain and sweet sorghums, sudan grass, maize (except in the drier areas), cotton, and pumpkins. Large areas of both native and Rhodes grass pastures supply grazing for dairy cows and horses. Lucerne is grown under rainfall conditions on alluvial soils where the water table is sufficiently close to the surface to provide moisture during dry periods, and occasional areas of cowpeas are sown for grazing.

Cropping Programme.

With such a diversity of crops, a comprehensive rotational programme is required on each farm to ensure that the best use is made of the available land. Obviously it would be difficult to include in a short article specific recommendations for cropping programmes that would meet the requirements of every farm in districts where dairying and cotton-growing are conducted. Certain basic factors apply to all such farms, however, and these are briefly presented in order that every grower may carefully examine their applicability to his property.

Broadly speaking, good farming is only possible when the cropping capabilities of the different soils on the farm are understood and the property is subdivided so that each paddock contains only the one soil type. Thus, on a farm with both alluvial flats and hilly slopes, a paddock should not include both, for they normally differ in their fertility and

cropping possibilities. Likewise, if either the alluvial flats or the hillsides consist of more than one soil type, each should be farmed independently from the other if at all practicable. Thus, should an alluvial flat consist of an area of fertile heavy soil originally under red gums (often called blue gums) and an area of less fertile hard clay or clay loam originally under box trees, the two areas should not be enclosed in the one paddock, for they require different cultural and cropping practices.

It is also necessary to ensure that the farm programme will provide for the ploughing of pastures when their productivity falls to low levels, and that the cultivated ground be not cropped until the top soils fail to permit the easy penetration of storm rains.

A cropping programme which meets these requirements is essential on every dairy-cotton farm in this State. Many districts have been opened for closer settlement since 1920 and originally consisted of either open forest or scrub covered country. The forest country was mostly well covered with native grasses noted for their food value and palatability. Considerable areas of scrub country were rapidly brought under Rhodes grass by felling and burning the timber, planting cotton in the ashes, and then sowing the Rhodes grass towards the end of the cotton crop. The resultant pastures originally had a high carrying capacity and the yields obtained from dairying on them tended to divert attention from cultivated crops. The need for such crops is now apparent on many farms where, as a result of heavy stocking, the valuable native grasses have been replaced by more vigorous species of lesser food value and carrying capacity. Rhodes grass pastures similarly have lost much of their earlier productivity, and weeds have become troublesome. At the same time, deterioration in the older areas under permanent cultivation has occurred through either soil erosion or a change in soil structure which lessens its capacity to absorb and hold rain.

Investigations conducted at the Biloela Research Station and on farms in cotton-growing districts have shown that if worn out pastures are ploughed and planted with cotton for three successive seasons, a Rhodes grass pasture can be re-established and depended on for three seasons' good growth. It has also been ascertained that ploughed pasture land makes better use of rainfall than old cultivations on the same soil type and that storm rains occurring when crops are growing, penetrate deeper in the newer cultivations, particularly in row crops and on sloping county. These factors are of the utmost importance for much of the summer rainfall is of the thunderstorm type wherein two or more inches of rain fall in a few hours. In old cultivations on relatively level clay loam to clay alluvial soils, such rains may not penetrate more than 5 inches in mid-season if the tillage operations have ceased and the surface of the soil has caked. In the more permeable first or second year of cultivation following the ploughing of grassland, such rainfall penetrates to a much greater depth. This increased penetration of rainfall into the clay loam and clay soils which are the dominant types in these districts, is highly desirable and can be obtained by the inclusion of a Rhodes grass pasture for three years in the rotations practised on all cultivated areas. As periods of water stress of varying intensity are frequently experienced by most crops grown on old cultivations in these districts, the improvement of the permeability of the soils through including Rhodes grass pastures in the rotations, with the resultant increased penetration of rainfall, is obviously desirable.

When pastures are ploughed, the balance of plant foods in the soil is favourable to crops such as cotton which do not require large amounts of nitrogen. On the other hand, fodder crops may not grow well on soils of only medium fertility during the first year of cultivation after a long established Rhodes grass pasture, and it is advisable, therefore, to grow cotton at this stage in the rotation. The cultural operations required to grow this crop make available sufficient nitrogen for satisfactory growth in the following fodder crops. Conversely, if fodder crops are grown for a few years after the cotton crop, it may be necessary prior to re-establishing Rhodes grass, either to grow an early-planted crop of cowpeas for grazing off by mid-summer or to leave the land in a rough fallow during the spring and early summer. Either procedure will increase the nitrogen content of the soil sufficiently to promote a substantially better growth of Rhodes grass than would be the case if the grass was sown directly after a fodder crop such as sorghum, oats, or wheat.

Summary.

The decline in the productivity of both pastures and old cultivations on dairy-cotton farms in districts receiving an average annual rainfall of less than 30 inches, makes it highly desirable that farmers should consider suitable remedial measures. Generally speaking, failure to practise suitable rotations has been the cause of reduced yields from both pastures and cultivated crops. The productivity of pastures can be greatly improved by ploughing them out, growing cotton for one to three years according to the fertility of the soil, and then establishing Rhodes grass for at least three years.

Investigations have also demonstrated that cotton crops yield particularly well during the first three seasons following grassland. There is a better balance of plant foods required by the cotton crop and the surface soil is kept more permeable with such a rotation than is the case where the land is cropped for long periods. The improved permeability of the surface soils permits better rainfall penetration than occurs in old cultivations, particularly heavy clay loams and clays, thereby providing more subsoil moisture for the crops.

It is advisable too, to incorporate Rhodes grass in rotations including summer and winter growing fodder and grain crops. There may be insufficient nitrogen for these crops, however, in the first year after Rhodes grass. Cotton should therefore be the first crop planted after the pasture is ploughed as the cultural operations in this crop stimulate the production of sufficient nitrogen for the following fodder crops.

Where Rhodes grass is to be established on land that has been cropped to cereals or sorghums for some years, an early planted cowpea crop for grazing or several months' cultivated fallow should precede the establishment of the Rhodes grass, to provide sufficient nitrogen to promote a satisfactory growth of the pasture.

CHANGES OF ADDRESS.

Subscribers are asked to kindly notify changes of address to the Department of Agriculture and Stock, Brisbane, without delay.

Passion Fruit in the Tropics.

W. G. HANCOCK.

THE ordinary purple passion fruit, *Passiflora edulis*, is usually planted against a fence-type trellis, as is the normal method in cooler latitudes. However, vines planted this way seldom live long and usually succumb to bark injury close to the ground, and passion fruit culture is generally voted a failure.

In the same locality, however, a stray vine growing along the edge of some scrub may flourish year after year. Observations tend to show that passion vine stems are easily injured by heat, and the feeding roots are shallow and killed by hot surface soil. These conditions exist when the vine is grown on a vertical trellis, for the sun strikes the base of the stem and heats up the soil around it. In the case of a vine growing in the scrub the stem is shaded by vegetation and the roots are in a cool moist soil; only the foliage coming into the sunlight.

If these conditions are copied and passion vines grown over a pergola in a similar manner to granadillas, so that the plants are set in the centre of the shaded area, they will flourish and bear for several years.

The young plants are shaded and trained up a stake to reach the top of the pergola, over which they clamber, thereby shading the stems and ground underneath. Vines should have sufficient water in dry weather and cultivation should not be deep or too frequent over the root area.

WHEN WATER IS LIMITED.

For small fruit trees and shrubs in dry districts where water supplies are short, the maximum value from the few gallons available is obtained by sinking one or more punctured kerosene tins in the ground a few feet from each tree or shrub. If these are occasionally filled with water the whole of it will percolate amongst the roots; whereas the same amount applied to the surface would be evaporated and wasted. At the best the latter practice only encourages shallow rooting, which further aggravates drought conditions, while the former encourages deep rooting.

In the home vegetable and flower garden likewise, 2-lb. jam tins set amongst the plants will make a gallon or two of water go a very long way.

—W. G. HANCOCK.

WARTIME FOOD PRODUCTION

The following notes are taken from the current Newsletter issued by the Department of Agriculture and Stock to District War Agricultural Committees.

Dairy Production in Queensland.

Although butter and cheese production for 1943-44 was not so very far below the goal set for Queensland, it was realized in all quarters that had a normal dry winter been experienced, butter and milk supplies would have been rationed much more severely than was actually necessary.

In reviewing the causes for lowered production and examining means by which output may be raised, some interesting facts have been brought to light. It was estimated that 2,000 farmers had gone out of dairy production. The main decline in numbers occurred in 1941-42, when the figures represented twice the number in the next two years, insofar as people leaving the industry were concerned.

Although the total number of dairy cows fell by only 40,000 (1¼ per cent.) from 1941 to 1943, the total number being milked apparently declined by 250,000 (10 per cent.). It appears conclusive that farmers are milking fewer cows and a smaller proportion of their herds. It is also obvious that cows are not being milked to the full period of their lactation. The inference to be drawn is that labour is not available to do normal duty as milkers.

In summarizing the causes for the falling off of Commonwealth production of 17 per cent., a Commonwealth authority attributes 10 per cent. to shortage on farms still in dairying, 3-4 per cent. to farms on which dairy production has been discontinued, and 3-4 per cent. to fodder shortage and other wartime difficulties.

The following figures indicate how production of butter and cheese in Queensland has varied since the commencement of the war:—

Year	Butter Tons	Cheese Tons	Total Milk Equiv. in Galls.
1939–40	62,000	6,000	291·2 million
1940–41	52,000	5,000	244·2 ,,
1941–42	42,000	7,000	203·2 ,,
1942–43	49,781	12,669	251·4 ,,
1943–44	45,300*	10,799*	227·1 ,,

* Estimated.

These figures show a reduction in butter production of 13 per cent. between 1940-41 and 1943-44, but there is an increase of 54 per cent. in cheese production, while the milk equivalent of the two commodities combined has fallen 7·5 per cent.

The consumption of whole milk is not accounted for in these considerations, and, although it is not possible to obtain accurate figures, it seems fairly certain that while civilian consumption has been reduced the extra demands by the Services during the last three years would result in more milk being devoted to whole milk supply during 1943-44 than was the case in 1940-41.

Although it may be considered that dairy production in Queensland is being maintained at a moderately satisfactory level, it should be borne in mind that there has been a very considerably increased demand for butter, cheese, and milk. In addition to Australian Forces located in and near this State, there are Allied Forces, both Army and Navy, together with the heavy influx of A.W.C. personnel, to be supplied. Butter produced in 1943-44 was 11 per cent. below the goal and cheese showed a 30 per cent. reduction.

The reasons for failure to reach the required objectives are many, but most stress can be placed on labour shortage and seasonal conditions. The 1944-45 goals have not yet been announced, but the probability is that they will at least equal those of last year, so that efforts of all must continue if we are to meet the commitments which have been allotted to us.

MACHINERY.

Government Purchased Machinery.

District War Agricultural Committees are in a position to assist greatly in the Government plan of acquiring additional supplies of agricultural machinery in order to increase food production in this State. Local contacts provide the best source of recommendations of prospective users of equipment. It will therefore be recognised that co-operation in the distribution of all available machinery in such a way as will ensure the greatest benefit to the greatest number of producers is necessary.

Most of the equipment asked for on the first order placed with the Commonwealth Government is now in course of consignment to producers.

Plate 40.
Cattle on Kindon, near Goondiwindi.

French Beans.

Contributed by the Horticultural Branch.

OF beans grown in Queensland, Canadian Wonder is an all round favourite on the market, but because of its susceptibility to disease is not now grown to the same extent as formerly. Brown Beauty is very popular in all districts and is known as a hardy and prolific variety. Staley's Surprise also is grown fairly extensively and is usually planted two or three weeks earlier than Brown Beauty. Other varieties grown to a lesser extent are Feltham's Prolific and Burnley Selection, the latter being a new variety supposedly blight-resistant.

Plantings may be made at almost any time of the year, depending on local conditions in each district. On the North Coast, on areas free from frost, plantings are usual throughout the winter; in other districts spring or summer planting is preferred.

In some parts of Queensland difficulty has been experienced in raising a crop during the warmer months because of bean fly attack, but experiments have shown that it is possible to obtain at least partial control of this pest by spraying with nicotine sulphate and white oil. Information on this and other pests and diseases of beans may be obtained on application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

In preparing land for general market garden crops, along with cultivation they generally require the free use of well-rotted stable or other manure, but in the case of beans the application of heavy dressings of such manures often results in the production of an over-abundance of foliage and poor setting of pods. Beans grow best in a well-cultivated soil, preferably one which has been manured for a preceding crop. Well drained, clayey loams yield the best result.

Fertilizers should be used freely. There are available several commercial complete fertilizers for beans which may be purchased with confidence. The customary dressing is 6 cwt. to the acre. It should be applied in the bottom of the drills and covered with about an inch or two of soil before planting the seed. Planting is usually done in drills about 6 inches deep, and after applying the fertilizer and lightly covering it with soil, dropping the seed by hand and again raking in a light covering of soil. In the course of subsequent cultivation the drills will gradually fill up. The rows may be 2 feet 6 inches to 3 feet apart and the seeds spaced 6 inches to 8 inches in the rows; 35 lb. of small and 52 lb. of large seed is sufficient to plant an acre.

Horse cultivation is usually done, but it is not advisable for this work to be commenced in the early morning or at any time when the plants are wet, as the spores of certain diseases are more easily carried under these conditions. Weeds should be kept in check, as they will seriously affect the growth of the crop.

The maximum output of beans can only be gained by picking thoroughly as they become fit—that is, when young and tender; otherwise they will begin to form seed, and the plants will cease to bear marketable beans.

Vegetable Planting Tables.

VEGETABLES may be divided into two main classes—surface vegetables and root vegetables. Surface vegetables are cabbage, cauliflower, lettuce, beans, peas, and all those other plants which grow the edible portion above ground. The term root vegetables applies to carrots, turnips, beetroots, potatoes, and other plants of which the roots are the edible part.

In a vegetable garden it is a good plan to rotate these two classes—i.e., grow a root crop in the bed which has just produced a surface crop and, *vice versa,* grow a surface crop in a bed which has just produced a root crop. Briefly, the reason is that surface crops feed heavily on certain plant foods in the soil, and root crops feed heavily on other kinds of plant foods. If rotation of the two classes is practised, the balance of plant food in the soil is maintained. On the other hand, if surface crops are grown continuously, they will gradually become poorer. The same applies to continuous growth of root crops in the same bed.

If the supply of compost is limited and it is only possible to dig some into the garden after every second crop, then, as a general rule, it is advisable to always dig it in before planting the surface crop.

Liquid manure is one of the best means the home gardener has of supplying plant foods to vegetables—particularly surface vegetables—to keep them growing quickly. Where horse, cow, or fowl manure is available, liquid manure may be applied regularly every week. It is very simply made. Any container, such as a kerosene tin or clean oil-drum, may be used and enough fresh manure placed in it to fill it to about one-third of its capacity. It should then be filled up with water and covered with a bag or boards and let stand in the shade for three or four days, when it will be ready to use. About 1½ pints of the liquid should be added to 4 gallons of water—say, three large cupfuls to a kerosene tin—and the mixture then poured on the soil around the plants. The gardener can use his own discretion as to what quantity he gives each plant, but a pint is not too much. It is advisable to apply the liquid manure after watering, as no injury will then be done to tender roots. Care should also be taken not to pour the liquid manure over the plants, as young tender growth may be "burnt."

On the following pages are vegetable crop planting tables for the three main divisions of the State, which may be regarded as a general guide to the ordinary grower:—

When to Grow Vegetables.

SOUTHERN QUEENSLAND.

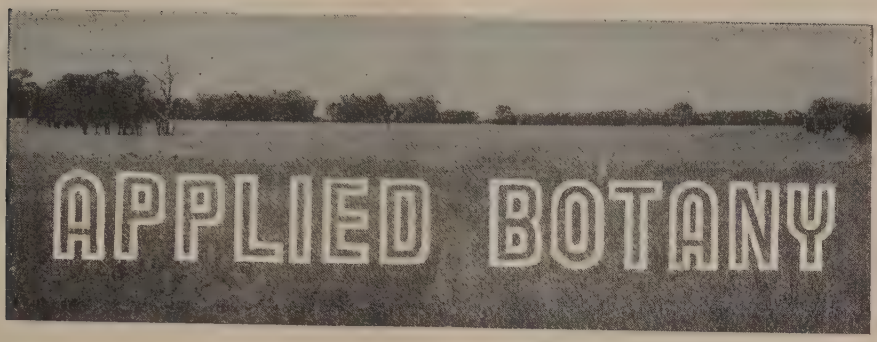
Crop.	When to Sow or Plant.		Approximate Period of Growth of Crop in Months.	How to Sow or Plant.		
	Coastal Districts.	Inland and Tableland Districts.		Distance Rows should be apart.	Distance Plants should be apart.	Depth to Sow Seeds in the Soil.
Bean	All seasons	October to March	3 months	15 inches	6 inches	1 to 2 inches
Beetroot	All seasons	January to March	3 to 4 months	15 inches	4 inches	½ to 1 inch
Cabbage	February to October	March to August	3 to 4 months	18 inches	18 inches	½ inch
Cauliflower	February to April	February to April	4 to 5 months	18 inches	18 inches	½ inch
Carrot	All seasons	All seasons	4 to 5 months	15 inches	3 to 4 inches	½ to 1 inch
Choco	August to October		6 months	4 feet	2 feet	2 inches
Lettuce	All seasons	All seasons	2 months	15 inches	12 inches	¼ inch
Parsnip	February and March	February and March	6 months	12 inches	4 to 5 inches	¼ inch
Potato (English)	August and February	August and February	3 to 4 months	18 inches	12 inches	5 inches
Potato (Sweet)	August to January	September to January	3 to 4 months	3 feet	15 inches	Plant cuttings
Pumpkin and Marrow	August to January	September to January	5 to 6 months	6 feet	3 feet	1 to 2 inches
Pea	February to September	March to August	3½ months	15 inches	6 inches	1 to 2 inches
Radish	All seasons	All seasons	1 month	12 inches	2 inches	½ to 1 inch
Silver Beet	All seasons	All seasons	1½ to 2 months	15 inches	15 inches	1 inch
Tomato	All seasons	September to February	3 to 4 months	On stakes 2 feet 6 inches	18 inches	½ to 1 inch
Turnip	February to June	February to June	2 to 3 months	15 inches	5 inches	1 inch
Turnip (Swede)	February to June	February to June	4 months	15 inches	9 inches	1 inch

CENTRAL QUEENSLAND.

Crop.	When to Sow or Plant.		Approximate Period of Growth of Crop in Months.	How to Sow or Plant.		
	Coastal Districts.	Inland and Tableland Districts.		Distance Rows should be apart.	Distance Plants should be apart.	Depth to Sow Seeds in the Soil.
Bean	All seasons	September to January	3 months	15 inches	6 inches	1 to 2 inches
Beetroot	February to August	September to December	3 to 4 months	15 inches	4 inches	½ to 1 inch
Cabbage	February to June	February to June	3 to 4 months	18 inches	18 inches	½ inch
Cauliflower	February to May	February to May	4 to 5 months	18 inches	18 inches	½ inch
Carrot	March to June	September to January	4 to 5 months	15 inches	3 to 4 inches	½ to 1 inch
Choco	July to November	September to November	6 months	4 feet	2 feet	2 inches
Lettuce	March to September	March to July	2 months	15 inches	12 inches	½ inch
Parsnip	March and April	March and April	6 months	12 inches	4 to 5 inches	¼ inch
Potato (English)	July and February	August and February	3 to 4 months	18 inches	12 inches	5 inches
Potato (Sweet)	August to December	September to November	3 to 4 months	3 feet	15 inches	Plant cuttings
Pumpkin and Marrow	July to November	September to November	5 to 6 months	6 feet	3 feet	1 to 2 inches
Pea	March to June	April to June	3½ months	15 inches	6 inches	1 to 2 inches
Radish	All seasons	All seasons	1 month	12 inches	2 inches	½ to 1 inch
Silver Beet	All seasons	All seasons	1½ to 2 months	15 inches	15 inches	1 inch
Tomato	All seasons	August to December	3 to 4 months	On stakes 2 feet 6 inches	18 inches	½ to 1 inch
Turnip	March to June	March to June	2 to 3 months	15 inches	5 inches	1 inch
Turnip (Swede)	March to June	March to June	4 months	15 inches	9 inches	1 inch

NORTHERN QUEENSLAND.

Crop.	When to Sow or Plant.		Approximate Period of Growth of Crop in Months.	How to Sow or Plant.		
	Coastal Districts.	Tableland Districts.		Distance Rows should be apart.	Distance Plants should be apart.	Depth to Sow Seeds in the Soil.
Bean	April to August	August to April	3 months	15 inches	6 inches	1 to 2 inches
Beetroot	March to August	February to September	3 to 4 months	15 inches	4 inches	½ to 1 inch
Cabbage	February to July	January to August	3 to 4 months	18 inches	18 inches	½ inch
Cauliflower	April to May	January to May	4 to 5 months	18 inches	18 inches	½ inch
Carrot	February to October	February to October	4 to 5 months	15 inches	3 to 4 inches	½ to 1 inch
Choco	July to October	August to April	5 to 6 months	4 feet	2 feet	2 inches
Lettuce	March to August	March to September	2 months	15 inches	12 inches	½ inch
Parsnip	February to April	January to April	5 to 6 months	12 inches	4 to 5 inches	¼ inch
Potato (English)	March to June	October, November, December, February, and March	3 to 4 months	18 inches	12 inches	5 inches
Potato (Sweet)	August to March	October to February	3 to 4 months	3 feet	15 inches	Cuttings
Pumpkin and Marrow	March and April and from August to November	November to February	5 to 6 months	6 feet	3 feet	1 to 2 inches
Pea	March to May	February to June	3½ months	15 inches	6 inches	1 to 2 inches
Radish	All seasons	All seasons	1 month	12 inches	2 inches	½ to 1 inch
Silver Beet	March to August	February to September	1½ to 2 months	15 inches	15 inches	1 inch
Tomato	February to July	November to July	3 to 4 months	On stakes 2 feet 6 inches	18 inches	½ to 1 inch
Turnip	April to June	February to May	2 to 3 months	15 inches	5 inches	1 inch
Turnip (Swede)	March to May	February to May	4 months	15 inches	9 inches	1 inch



ANSWERS.

(*Selections from the outward mail of the Government Botanist.*)

Red Cotton or Milky Cotton Bush.

D.C.V. (Kuranda)—

The specimen forwarded is the Red Cotton or Milky Cotton Bush (*Asclepias curassavica*), a native of the West Indies and tropical America, but now widely spread as a weed in most tropical and sub-tropical countries. It is widely spread in Queensland, but does not seem to be very abundant in any one locality, and mostly grows along creek banks. It has been proved to be poisonous to stock, but they rarely eat it in sufficient quantities to cause trouble.

The plant has been thought of as a source of rubber, but tests by the Chemical Branch of the Department of Agriculture and Stock do not show it to be very promising in this respect. The silky cotton in the pods can be used as a substitute for kapok, but its collection for this purpose would not be payable. It is not suitable for spinning in the same way as ordinary cotton.

Suggestion for Shade Trees in Winton District.

M.J.L. (Winton)—

1. *Albizzia Lebbek*, commonly known as acacia throughout the whole of the central and north-west. The plant can be raised from seeds and is fairly fast growing. If there is any trouble in germinating the seed, try it like wattle seed—i.e., put it in a cup, pour hot water on and allow to stand, say, overnight.
2. Kurrajong should do well around Winton.
3. Bottle Tree, both the narrow and broad leaved, are beautiful shade trees. The broad-leaved variety is a feature of the streets and gardens of Barcaldine. The shire clerk at Barcaldine could probably supply seed.
4. White Cedar should do quite well and makes a good shade.
5. Pepper Tree (*Schinus molle*) is hardy almost anywhere. The broad-leaved variety probably makes a better shade. The Botanic Gardens, Rockhampton, might be able to supply plants.
6. Portuguese Elm (*Celtis sinensis*) is a tree worth trying around Winton.
7. *Bauhinia Hookeri*, the native bauhina. Both this and *Bauhinia Carronii* make beautiful trees for the West. Plants of the former may be available from the Brisbane City Council, but it is rather a slow grower.

What about gum trees? Some of these, if topped, make beautiful shade, particularly the narrow-leaved ironbark, the citron gum, and river gum.

Small Passion Vine.

J.M.J. (Annerley)—

The specimen is the small passion vine (*Passiflora minima*). This is a very common tropical weed widely spread in Queensland. The ripe berries would be quite harmless, but the green berries of nearly all passion fruits should be looked on with suspicion.

Caustic Vine and Caustic Weed.

J.P.K. (Barcaldine)—

The large specimen of leafless vine or creeping plant is the Caustic Vine (*Sarcostemma australe*), a plant spread very widely over Australia. It is generally regarded as very poisonous to stock, but at times has been spoken of as quite a good fodder. There is, however, no question of the poisonous nature of the plant. Feeding experiments have definitely shown the plant to be poisonous to all classes of stock. The animals become restless, there is salivation, champing of the jaws and they go down. Bloat and vomiting sometimes occur. There are spasms from time to time. The pupil of the eye becomes dilated. There are paddling movements of the limbs and death occurs in from 12 to 24 hours.

The plant with very small leaves and inclined to creep over the ground is *Euphorbia Drummondii*, the Caustic Weed. This plant also is spread very widely in Australia. In New South Wales it has been shown to contain large quantities of a prussic acid yielding glucoside and to be capable of causing death in a very short time. Repeated tests in Queensland have always yielded negative results and the symptoms as described by experienced stockmen are not those of prussic acid poisoning. The head and neck of affected animals swell considerably. If this swelling is pierced an amber coloured fluid exudes and the life of the sheep may be saved. These symptoms were produced in Western Australia in rats fed on small quantities of the plant. It has also been spoken of as a fodder plant and the probability is that ordinary paddock resting stock are little affected by it. That at least has been the experience in Queensland. Most of the trouble has been in travelling or freshly untrucked stock, particularly sheep. Empty or undernourished animals are, of course, always more liable to poisoning by these plants than those in better condition.

Trees as Windbreaks.

L.C.S. (Numinbah Valley, Nerang)—

As a windbreak, probably the Cypress Pines are the best, but unfortunately under Queensland conditions many of the species are inclined to die out, leaving serious gaps in the hedge or windbreak. The best and least likely to die out in Queensland is *Cupressus Lambertiana*. This is obtainable from most nurserymen.

In the larger type of tree, probably the biggest varieties of Fig Tree are the best. The Moreton Bay, Small-leaved Moreton Bay and the Weeping Fig are all good. The Camphor Laurel also is a good windbreak. Plants of all these may generally be obtained through the ordinary nursery channels. A tree often planted at the seaside and which stands the wind well is the Pongamia Tree; another is Cupania.

Of the native Cypress Pines the Sand Cypress (*Callitris arenosa*) is an excellent tree and is not confined to sandy situations.

Gums sometimes make good shade belts and shelter trees and can quite frequently be transplanted direct from the forest. The Flooded Gum is one of the best, provided the land is rich enough for it.

Lippia Grass.

E.G.W. (Pittsworth)—

The plant is *Lippia nodiflora*, sometimes called Lippia grass. It is, of course, a herb, not a true grass. It was surprising to receive it from near Pittsworth, as it mostly occurs in seaside places on sandy soils, or on country subject to inundation with salt water. It is widely spread over the warm temperature regions of the world and in America is said to be valuable as a binder for river banks. In some places where it is difficult to get grass to grow, it is recommended as a lawn plant. It is hard to say how it came on to the Downs; probably with seed of couch grass collected in some coastal locality.

Wild Nutmeg.

J.E.L. (Proserpine)—

The specimen is the wild nutmeg (*Myristica insipida*). It may be used as a substitute for ordinary nutmeg, although it is not so strong. The seed is softer than the commercial nutmeg.

PLANT PROTECTION

Fruit-sucking Moths.

J. A. WEDDELL, Research Officer.

SEVERAL species of rather large moths (Plate 41) cause considerable damage to various commercial fruits by piercing the skin and sucking the juice from the ripening fruit. The mouth parts of these moths form a pointed and somewhat serrated proboscis which can be inserted into fruits with even a relatively hard rind. The greatest losses occur in citrus (other than lemons), but the banana, custard apple, grape, mango, papaw, peach, persimmon, pineapple, and tomato may also be attacked. Although sucking moth activity is particularly prevalent in coastal areas, outbreaks are also recorded occasionally from orchards in inland districts.

Plate 41.

FRUIT-SUCKING MOTH.—Adult male: Note the kidney-shaped spot in the hind wing.

The typical injury in ripening oranges is initially a simple puncture which may not be apparent unless the fruit is squeezed to force drops of juice through the hole in the rind. Later, following the entry of secondary rots, a brown, roughly circular area surrounds each puncture. A single fruit may be pierced several times. Injured fruit tends to ripen prematurely and soon falls to the ground. In fruits such as custard apple, mango, and papaw the entry of rot organisms through the sucking moth punctures causes particularly rapid decay. Green citrus fruits of early varieties may be attacked if the local moth population is high and if there is little alternative feeding material available. Normally, however, the moths are attracted to ripening fruit, and, in the early stages of an outbreak, any fruit fly stung fruit which ripens prematurely is repeatedly attacked.

In addition to the moths which pierce the skin of the fruit there are many others that visit already pierced fruit and feed on the juice which exudes from it. These insects do not cause any new injury or initiate any damage and are therefore of no economic importance.

Small beetles, generally referred to as fruit beetles, enter the punctures shortly after the fruit has been injured by the moths and growers sometimes regard these insects as the primary pest. The commonest of these fruit beetles* is a small, dark-brownish insect, one-eighth of an inch in length and more or less oval in outline. It lays its eggs in the fermenting tissues inside the puncture and the small, yellowish larvæ that hatch from these eggs burrow into and through the fruit. In spite of all appearances to the contrary, these beetles are purely secondary and do not cause any damage to unblemished fruit.

Life History and Habits.

One of the more important fruit-sucking moths† lays its eggs in the spring on the foliage of certain vines‡ that commonly grow in coastal rain forests, along creek banks, and sometimes in open forest country. The vines are usually vigorous climbers and some of them may reach far into the crowns of well grown trees. The leaves vary in shape in the different species from roughly heart-shaped to oval.

Plate 42.

Fruit-sucking Moth.—Caterpillars in retracted and extended positions. Note the eye spots and hump.

The caterpillars hatching from the eggs feed on the leaves of the vines and in about three weeks are full grown. At this stage the large caterpillar (Plate 42) is vividly coloured, about 2¼ inches in length, a quarter of an inch through the body, and has a pronounced hump towards the rear end. The colour is predominantly a rich, velvety black, speckled with brown, yellow, and white; odd individuals are brown rather than black. On each side of the body, just behind the segments bearing the true legs, are two large spots, often called eye spots because of their general resemblance to eyes. The caterpillars rather characteristically rest on the plant with an upwardly projecting loop to the body and, if disturbed, they twist and turn before falling to the ground.

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* *Carpophilus hemipterus* Linn.

† *Ophideres fullonica* Linn. Other species commonly implicated include *O. materna* Linn. and *O. salaminia* Fabr.

‡ These belong to the botanical family *Menispermaceae*.

The full-grown caterpillar webs adjacent leaves of the vines together to form a loose shelter (Plate 43, fig. 1) within which it transforms to a rather stout, dark-brown to purplish coloured pupa (Plate 43, fig. 2), $1\frac{1}{4}$ inches long and about four-tenths of an inch broad.

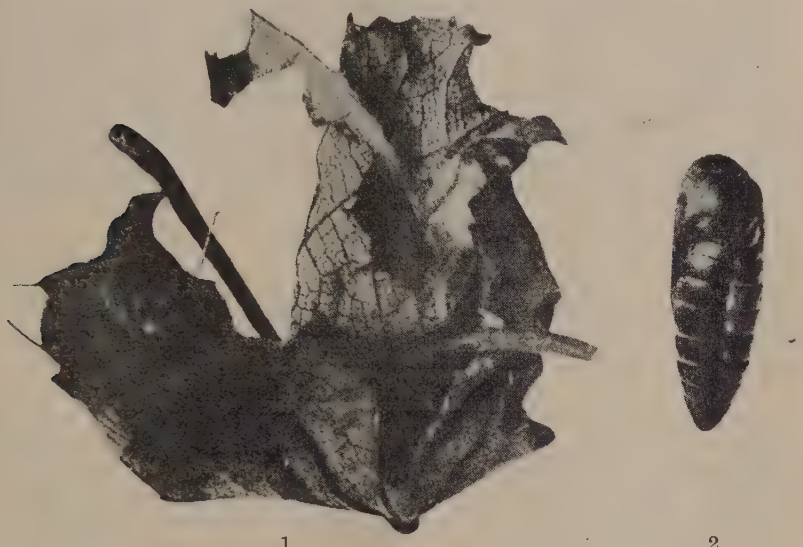

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Plate 43.

Fruit-sucking Moth: Fig. 1.—Webbed leaves of vine in which pupation takes place. Fig. 2.—Pupa.

The adult moth emerges from the pupa about three weeks later. The female moth is large and stout bodied, the body length being about $1\frac{1}{3}$ inches and the wing spread 4 inches. The forewings may vary from dark-green to greenish-brown, with an intricate, greyish, mottled pattern. The hind wings have a broad, dark-brown band on the front and outer margins, the latter being tipped with six white spots; the inner portion of the wing is orange-yellow with a large, kidney-shaped, brown spot. The male (Plate 41) is very similar except that it is slightly smaller and the forewing has a dull pattern consisting of two khaki-brown portions separated by a slightly lighter brown band.

The moths are strong fliers and they may be found in inland orchards far from any known areas in which their larval food plants grow. They normally shelter by day in timbered country adjacent to the orchard which is visited each night from dusk onwards when feeding takes place. The moths are not strongly attracted to lights.

Moths may be found from November until May in Southern Queensland, but the semi-dormant period in winter is shorter further north where the moth is active for a longer time.

From season to season considerable variation in sucking moth incidence occurs and this may be explained in several ways. If good rains fall in early spring, the vine growth in late spring and early summer is prolific. Ample food supplies are then available for larval development and moth populations rapidly increase. A limiting factor

to such an increase in the number of moths on the wing, however, is the activity of certain wasp parasites that attack and destroy the caterpillars. The interaction of factors such as these affords some explanation of the sporadic nature of fruit-sucking moth outbreaks.

Control.

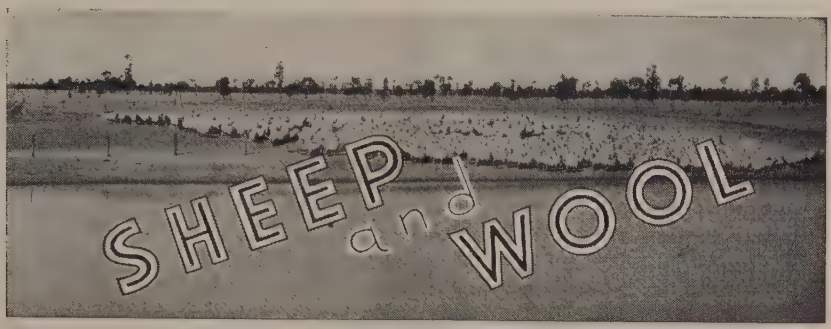
It may be thought that the control of this type of pest could be achieved by the elimination of the vines on which it breeds. In practice this is not feasible, for these vines are widespread, and in any case their destruction near an orchard would do little to prevent invasions by the strong flying moths from breeding grounds further away. The only known method of control is the direct destruction of the adult moths in the orchard, and even this is not altogether satisfactory.

Several "common-sense" methods of control can be applied, but, in all, it is essential that the work should begin some weeks before the fruit is expected to ripen on the tree, and control measures should be continued for as long as moths are caught in any numbers.

Trees in the orchard should be examined by the grower each evening with the aid of a torch or lamp. Moths, when feeding, are not readily disturbed and can be easily captured or swatted on the fruit. Trees with ripening fruit should receive particular attention. After a few visits to the orchard it may be found that the moths have a particular preference for certain trees and attention can then be concentrated on these trees.

Sucking moths are particularly attracted to ripe and over-ripe bananas, hence, if these are readily available, bundles of five or six ripe fruit may be tied with string or wrapped in open weave calico and hung as lures in the trees. On the nightly examination any moths that have been attracted can be destroyed.

Fallen, prematurely ripened, fruit in the orchard could also be gathered into small piles to attract the moths, were it not for the risk that any fruit fly larvæ in it would survive and complete their development. Any such fruit should normally be gathered regularly and destroyed as part of the ordinary fruit fly control programme. However, if bananas are not available for making the lures, fallen fruit may be used if the precaution is first taken carefully to sort out and destroy any which show fruit fly stings. The remaining sound fruit may then be either distributed in small piles on the ground throughout the orchard or, alternatively, wrapped in open weave calico, and hung in the orchard as lures. All of the fruit lures need to be examined each night and also renewed every three days. Fruit discarded from the lures should be destroyed immediately in case new fruit fly infestation has occurred. Some growers also use improvised traps made from hessian bags, the mouth of each bag being braced open by strong wire. The bag is suspended upside down with the fruit lure hung in the mouth. After feeding on the fruit the moths tend to move upwards into the bag at dawn, and they may be killed first thing each morning. If the moths clearly show a preference for certain trees, then lures or traps should be concentrated mainly in the vicinity of those trees.



The Sheep and Wool Industry in Queensland.

ALTHOUGH every branch of sheep husbandry is practised in Queensland, wool production is the predominant interest of the pastoral industry. The western districts of the State are particularly adapted to the production of fine wools, and that is the principal reason why over 98 per cent. of present-day appraisals are made up of merino fleeces. With vast stretches of natural pastoral country extending from the New South Wales border to north of Cloncurry, climatic and local environmental conditions have naturally a wide variation, but on these thousands of square miles of largely open, rolling downs and plain country the general conditions are peculiarly suitable for pastoral purposes on a large scale.

Climate and Rainfall.

Queensland has, roughly, three climatic regions: the coast and adjacent mountain slopes with average annual rainfalls varying from 40 to 180 inches, the latter being for the coastal country between Cardwell and Cairns which is the heaviest rainfall region in Australia; the mid-interior where rainfall averages range from 15 to 25 inches; and the far-interior where the average rainfall is mostly below 10 inches and the rate of evaporation high. The main wool-growing districts are situated in the mid-western and western divisions of the State. Most of these territories is held under lease from the Crown.

Distribution of Flocks.

Flocks are few in the regions of higher rainfall where they are usually run as a farmer's sideline as mutton sheep, and in which Romney Marsh blood predominates.

West of the Main Dividing Range, on many well improved properties in the eastern section, fat lamb-raising is combined largely with wheat growing. Sheep also are often included in diversified farming enterprises. In this region also are established registered sheep studs of British breeds to supply foundation lamb-raising flocks, as well as to provide new blood for established flocks. Merino stud flocks also have been established here, but not to the same extent as in the country further west. Stud sheep breeding, both for wool and mutton production, is on the upward grade.

In the lamb raising regions, both summer and winter crops are grown successfully and are used for topping up fully 95 per cent. of the crossbred lambs which go through the Cannon Hill saleyards, near Brisbane, as prime suckers for export.

The agricultural areas, however, are rather limited in extent, as compared with the vast tracts of good pastoral land extending further westwards and northwards and which is gradually being improved for increased production. This process is obviously slow, especially in present circumstances and under existing conditions, but eventually many flourishing flocks of various breeds and their crosses will have been established. Even now, in these districts there are many crossbred flocks with both British longwool and Corriedale foundations.

The Corriedale breed particularly show to advantage in the near- to mid-western region, as conditions generally are suitable for its development both as a mutton and wool producer. The best of this country is that which was formerly timbered densely with brigalow and belah "scrub" and, until recent years, carried an almost impenetrable covering of prickly-pear. The coming of the cactoblastis caterpillar proved a veritable godsend to landholders, and to that insect a memorial community hall has been erected at Boonarga in gratitude for deliverance from one of the worst pests ever imported into this country.

In Western Queensland proper is the purely pastoral country which has contributed so greatly to Australia's wool producing reputation. It consists mostly of undulating, well-grassed, lightly timbered pastoral country which, in a good season, is impressive in its obvious opulence. In normal years, the wet season is in the summer and is usually preceded by a series of thunderstorms occurring sometimes as early as October. The winters, with days of brilliant sunshine and frosty nights are, climatically, superb.

Practically the whole of the country west of the Dividing Highlands is situated in the world's largest artesian basin, which does not include, however, the high lands just south and west of Cloncurry. The artesian water varies in quality, but its use has made productive huge areas that otherwise would be too dry for continuous pastoral occupation. The pastoral country of Queensland is as large as Western Europe.

Sheep Breeding in Queensland.

Breeding is practised so generally on most of the pastoral country that flock replacement is constant, ewe lambs being retained for breeding and wethers made available for sale as woolgrowers to pastoralists who find it more economical to buy sheep than to rear them, because of the nature of their country, which includes the treeless plains of the West and of other local conditions. Although large areas of Western Queensland may be regarded generally as of light stock carrying capacity, the sheep are usually big and carry a heavier fleece than similar sheep running on the richer pastures further east. These environmental characteristics have induced many merino breeders to go in for stud breeding and, as a consequence, membership of the Queensland Stud Breeding Association is increasing. The number of sheep qualified for registration also is increasing, and the beneficial influence of better sires is already showing in their progeny. This general improvement in flock standards has led to the holding of sheep and wool shows in many pastoral centres. The quality of the exhibits at these

shows would merit their entrance as probable prize winners at any of the bigger merino exhibitions, and has stimulated keen competition among the breeders. Naturally, this increase in the number of high-quality sheep is having a valuable influence on the industry generally, and on neighbouring pastoral holdings particularly.

Flock Classing.

The importance of classing the breeding flock is becoming more widely recognised. The first result of this practice, of course, is in heavier and denser fleeces, while classing for conformation leads to evenness of type and covering and, consequently, a better clip and a more desirable carcase.

Queensland pastoral areas are now fully stocked, while last season's wool clip approached closely to that of the peak year (1942-43) production which returned to the growers a little over £14 millions.

Preparation of the Clip for Market.

J. L. HODGE, Instructor in Sheep and Wool.

PREPARATION for shearing on a property of any considerable size calls for much thought, and the necessary action, before the actual shearing commences. Too often this is left to the last minute, with consequent worry and bustle and hustle at the commencement of operations.

Owners would be well advised to take early action in the following details of good management, to mention only some of the many which demand attention even on the best equipped properties:—An inspection of the shed itself is bound to reveal something which should be done for its efficient working. Machinery should be overhauled, and handpieces put in order. The catching pens should be put in proper repair, a rail out here and a rail wanted there. Pen gates should be properly hung to allow the shearer quick ingress and egress. Down chutes nearly always call for repairs, mainly because of their exposed position. Counting-out pens and gates are subjected to some pressure, and therefore are bound to be in want of attention. The branding race should be in first rate order and some repairs are usually required.

In the shed, loose battens may be found and these should be firmly fixed to save injury to the sheep. The wool press may want an overhaul. New ropes may be necessary and these should be fixed well before starting time. Wool packs should be opened and placed handy to the press. Bale fasteners should be in place. Wool tables may want repair, a loose leg here or a broken batten there. The same applies to wool bins.

On the shearing board, the containers for the dressing to be used on cuts should be filled and placed in handy situations. Brooms should be in place. The engine should be given a trial run.

The observance of all these details makes for a smooth start, and it very often follows that a smooth start means a smooth run right through the shearing.

Order of Shearing.

The order of shearing is generally determined by some point in conjunction with the management of the property. It may be that a

certain paddock is wanted for shorn sheep, therefore it becomes necessary to muster that particular paddock, and, of course, shear the sheep while in hand. A lot of rams may be in the way, and it is desired to get them out; in that case, the rams would be shorn first. Possibly there are ewes with long-tailed lambs in the flock, and it may be desired to mark these lambs while in hand. In that case, the ewes would be shorn last, when all other sheep are out of the way and the yards are free.

Enough has been said to indicate that the order of shearing is important. Proper choice in the order of shearing saves muddle during the whole busy period. It is well to have some fairly accurate idea of the number of sheep the shearing team is capable of turning out in the day—this with the idea of yarding and shedding only a little over the necessary number for a day's run. It is not right to keep sheep in the yards for two days and sometimes longer. As evidence of lack of planning or foresight it jars one's sense of good management.

Sheep should be shedded and penned the night before shearing is to commence, and it should be the duty of someone in authority to take a careful look round every night to see that sheep are not too "tight." Neglect to do this may, some morning, reveal a number of casualties as the result of crushing and smotherings.

Classing the Clip.

Of first importance is the choice of an experienced classer, for the whole of the "get up" of the clip is in his hands and financial results are dependent upon his efforts. Apart from the actual classing of the fleece portion of the clip, his duties are many and varied. He is in complete charge of the wool room and the workers in it; so everything in the room connected with the clip is his direct responsibility.

Duties of a Classer.—It is the duty of the classer to display the wool honestly, so that the buyer or appraiser has no difficulty in arriving at the true value of the various lines. This applies not only to the fleece lines but to every line right down to the locks.

Locks.—If the shed is big enough, table locks and board locks should be kept separate. The former are those locks which fall under the wool tables in the process of skirting, and the latter are those swept from the shearing board. The difference in price is often appreciable.

Bellies.—All bellies should be skirted. That portion of wool removed brings its value in a lower line, while the improved belly wool line may enhance in value up to ½d. or even a 1d. per lb. All bellies from male sheep should be "ringed" in addition to skirting. Ringing means the removal of all pizzle pieces.

Stained Pieces.—Stained pieces should always be kept separate. If at all damp, provision should be made for drying the pieces before baling. This may be done by putting up a wire netting rack outside the shed. The stains thus get the benefit of sun overhead and air underneath.

Brokens and Pieces.—Generally speaking, these lines could be better handled, and the work should be done by a competent man. The brokens should be kept as large as practicable with all fatty ends removed. What is not good enough for the brokens obviously goes for the pieces, and here again it is just as necessary to remove all fatty ends.

Fleece Lines.—While a general supervision of the foregoing lines is maintained by the careful classer, the treatment of the fleece lines is directly in his own hands. Dependent on the wool available, the classer will make such lines as his experience and a close study of the market indicate. Particular importance, especially at the present time, should be given to quality, yield, length of staple, and colour.

Quality covers a number of virtues, such as "handle," condition, the dimension of the fibre, and so on.

Yield means the proportion of clean wool left after the removal, by scouring, of all foreign matter, including fat or yolk.

Length of staple is important. Every effort should be made to keep fleece lines as even in length as possible. Even in lines of the same quality there should be no very pronounced difference in length.

Skirting is most important work. There is a tendency for shed hands to remove too much from a fleece of a free nature, and this results in direct loss to the grower inasmuch as every pound of wool removed unnecessarily from the fleece brings in value the price given for the lower grades into which it is eventually placed. With a free line, the operator should be able to give a reason for all wool removed. In a line of wool carrying seed, deep skirting is probably necessary in an endeavour to "free" the fleece. On the other hand, a very seedy line requires light skirting, the fleece portion then being offered as a seedy line.

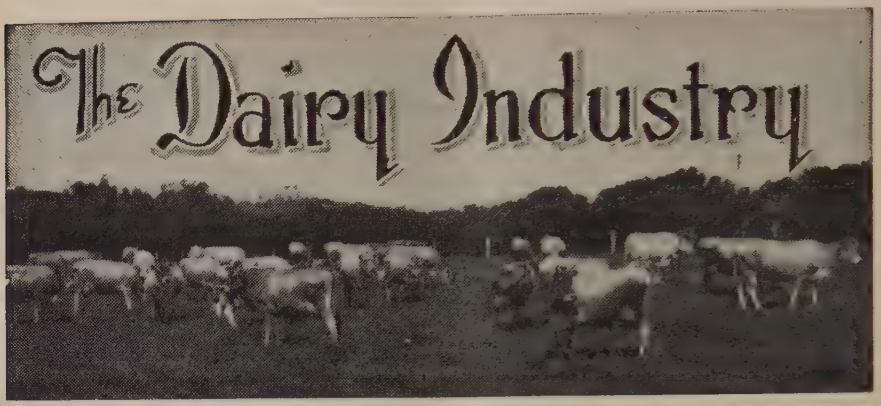
With appraisement in the disposal of our wools, there has been a distinct tendency on the part of some classers to *overclass* a clip. This is a fault, especially if it entails star lots. The classer should have sufficient confidence in his own work to put together wools of equal value, without, of course, ignoring the rules of good classing.

At the cut out of any particular line of sheep, the classer should, if necessary, insist on a clean up.

Pressing.—Careful pressing is an integral part of the general get of a clip. Bales should be kept as even in size and weight as practicable. Clean cut stencils should be used in the branding of bales. The station brand, the quality of the wool the pack contains, and the number should be clearly indicated. Careful branding goes a long way in indicating the get-up of a clip when the wool is displayed for inspection on the broker's show floor. At the present time, every effort should be made to get as much wool into the pack as possible. Apart from the scarcity of packs and their high price, there is the question of shipping and handling. A great saving all round would be made if growers got even another 10 lb. of wool into every bale.

At the cut out of every flock, it is the duty of the classer to advise his selling broker of the line of wool represented by certain bale numbers, a brief report should also accompany this advice note; this greatly facilitates the handling of the wool on its delivery into store.

With the counting out of each shorn flock, branding usually follows. The brand should be carefully applied in the position allotted on the sheep. No tar materials should be used. A branding fluid should possess two qualities: first, it should remain legible on the sheep during the growth of the twelve months' fleece; and, secondly, it should scour out without any harmful effect to the scouring mixture. Such branding fluids may be purchased from proprietary houses.



Improving the Dairy Herd.

E. B. RICE.

MANY dairy farmers, because of limited capital resources, have had to begin with a herd of "scrub" or nondescript animals of low production, but this need not deter them from pursuing a progressive breeding policy which will eventually lead to the possession of a highly improved dairy herd. In fact, anyone who is satisfied to continue with inferior or "scrub" stock cannot be expected to find interest in his avocation, or look forward to creating an independence even after long years of hard work. Herd improvement, on the other hand, stimulates interest and leads to progress and financial stability.

Sire Selection.

In the building up or grading up of dairy stock, the sire is of first importance, for he is the foundation upon which dairy progress is made. The choice of any particular breed of bull will naturally depend on factors such as whether the object is milk supply or cream production, the class of country and the individual preference of the farmer. Whichever breed is decided on, only by following a policy of strict adherence to that breed may a herd of the correct dairy type and higher production be surely developed. A pure-bred sire is, of course, essential, and he should preferably be descended from a dam whose production has entitled her to be included in the advanced register of her breed. The better the production backing of the young bull's maternal and paternal ancestors (particularly of the near ancestors), the more likely will his female offspring be higher producers than their dams.

The lists of records of production of animals submitted to the official pure-bred testing scheme conducted by the Department of Agriculture and Stock, furnish information concerning stock with official records. There is thus a wide range of officially tested cows from which a suitable bull calf may be selected.

Selection of Cows.

As soon as the first crop of heifers from the pure-bred sire come into profit, the gradual replacement of the original inferior cows commences—substituting the heifers for the most inferior mature cows. The use of successive high quality, pure-bred bulls and the constant culling of inferior cows and replacing them with heifers from high-producing stock will materially increase the herd yield within a few years. On reaching this stage, a system of line-breeding, by using sires of a selected blood strain, is followed.

In order to obtain reliable data on productive ability, herd testing should be a corollary of any progressive herd improvement plan. Moreover, once a high class dairy herd has been built up, adequate feeding is essential, if the cows are to be enabled to produce to their maximum inherited capacity. The utilisation of home-grown feeds for this purpose is usually the only economically feasible means in Queensland and this requires the growing of suitable seasonal fodder crops and the conservation of hay and silage for supplementing the food obtainable from the grazing of pastures during the drier months.

Summary.

1. Purchase a pure-bred bull, of proved production ancestry.
2. Cull cows according to production.
3. Join the free herd-testing services conducted by the Department of Agriculture and Stock to obtain accurate records of cows' productive capacity.
4. Provide adequate fodder reserves to tide over periods of pasture scarcity.

Cottage Cheese.

W. J. PARK.

ALTHOUGH cottage cheese has been made in small batches on dairy farms for many years, it is only during the last twelve months that it has been manufactured on a commercial scale. All experimental work was done at the Pittsworth Cheese Factory by Mr. R. Duncan, and to him goes the credit for producing an article of sound keeping quality and suitable for the particular trade for which it was manufactured.

Early attempts to manufacture cottage cheese in Queensland were along lines laid down by standard text books on the subject from overseas countries, but the resultant product was unsuitable for the trade. This necessitated lengthy experiments before a suitable article was produced, and brought forward a number of wide variations from the usual methods. It was found that the process of manufacture could vary from day to day, and to extremes unknown in normal cheddar cheese manufacture. The individual skill of the operator is of prime importance, and he must know the exact procedure to adopt to produce the type of cheese required. This knowledge can only be gained from experience and from a careful study of temperature, body and texture and acidities.

Before dealing with the process of cottage cheese-making in Queensland, a brief resume of the process as adopted in America will be given to show the wide variations between the two countries.

The Conventional American Process.

Cottage cheese is made from skim milk which is pasteurised either by the batch (145° for 30 minutes), or flash (156-160° F.) method. The milk is then cooled to 70° F. and approximately 5 per cent. starter added. The ripening is allowed to proceed for 12-15 hours until the acidity reaches .75 per cent. to .90 per cent. with a firm, uniform coagulation. The curd is then cut with curd knives (the blades set ½ inch apart) and 10 per cent. of water added at from 100-105° F. This starts to firm the curd and the batch is stirred with hand rakes while the temperature is raised to 110°-125° F., the cooking process taking from 35-50 minutes. The whey is drawn or syphoned off as soon as the curd has reached the desired stage of firmness.

The curd is washed with cold water after all the whey has drained off, then cooled with cold water, drained and salted at the rate of 2-2½ lbs. salt per 100 lbs. cheese. The cheese is then packed and stored in refrigerated rooms until sold, being usually consumed within four days of manufacture.

Cottage Cheese as Made in Queensland.

Cottage cheese is made from skim milk which is pasteurised to 156-160° F. and then cooled to 90° F. The usual practice is to pasteurise the whole milk as received and then separate the pasteurised whole milk and run the skim milk direct into the making vat.

Ripening and Preheating.—The percentage of starter culture required depends on the initial acidity of the skim milk, the ripening temperatures used, and the time of the year; it varies from 5 per cent. to 15 per cent. The starter is added to the vat and the milk is agitated while being slowly heated to 98-102° F. This heating process, which should take place as rapidly as possible, has been found necessary in Queensland to bring about the desired firmness of curd at the time of coagulation. When the desired temperature is reached the agitators are stopped and the vat covered and allowed to ripen. In from 4-6 hours from the time the starter is added the milk should have coagulated and show an acidity of from ·75 to ·85 per cent. If the temperature has not dropped too low, the curd should be ready to work at this stage.

Breaking the Curd.—The usual practice in America is to cut the curd with curd knives, the blades of which are set ¾ inch apart. In Queensland it was found that the loss of curd in the whey was too great and it is necessary to break up the coagulum by hand. The curd is broken up and slowly agitated by hand. This gradually firms up the curd, and all stirring until wheying off must be done by hand as hand rakes and mechanical agitators are too severe.

Cooking.—The batch is slowly heated (or cooked) at the rate of ½° F. per minute, increasing the temperature to as high as 20° F. above the temperature at the end of the ripening period. The temperature and period of time depend on: (*a*) The rate of acid development during ripening; (*b*) the acidity at the time of breaking; (*c*) the body and texture of the curd. The body and texture of the cheese must be closely checked at this stage, the best method for doing this being to place a handful of curd in cold water. This brings about rapid cooling and gives an indication of what the resultant cheese will be like. If the batch is ready to whey off, the curd will be firm without being tough, will crumble readily in the hands, and the curd particles will not have soft centres.

Wheying Off.—The whole of the curd is drawn back to the top end of the vat and allowed to settle. This can best be done with curd rakes and draining boards, and care must be taken not to break up the curd lumps and so increase losses in the whey. As wheying off is progressing, drains are made in the centre and sides of the curd to speed up the process. The whey at this stage should be clear and show an acidity of from ·60 per cent. to ·70 per cent. depending on the acidity of the bulk at the time of breaking of the curd. The curd is then allowed to drain for 5-10 minutes until most of the whey has escaped.

Cooling.—When the curd has reached the desired stage of firmness at wheying off, the temperature of the curd is still within a few degrees of the cooking temperatures. If the curd is allowed to remain at this temperature for any great length of time it will result in too much firm-

ing up of the cheese. For this reason, cooling should be carried out as soon as possible after the bulk of the whey has escaped from the curd particles. The cheese is spread out over the bottom of the vat in evenly-sized blocks and cold water allowed to run through the vat. After a few minutes, the draining tap is shut and cold water added to the vat until the curd is completely covered. The curd is left in this water for 10-20 minutes, after which the water is drained off.

Salting.—When draining is completed the cheese is salted at the rate of 10-20 ozs. per 100 lbs. of cheese. The salt is spread evenly over the cheese, the cheese being then packed into suitable containers for transport to the consumers. It is advisable to hold the containers (usually cans) in a refrigerated room until the cheese is consumed, as low temperatures retard bacterial development and deterioration of quality.

Yield.—The yield of cheese is usually from 130-140 lbs. per 100 gallons of skim milk treated.

General Remarks.—Cottage cheese has a higher moisture content than ordinary hard types of cheese, and for this reason even more care than usual must be taken to see that all equipment used is thoroughly cleaned and sterilised.

In addition to this, the following rules must be observed:—

(*a*) Keep the pasteurising temperature (flash method) within even limits, viz., 156°-160° F. If all equipment is in a clean and sterile condition these temperatures should give a satisfactory "kill." If temperatures above these limits are used (e.g., 165°-170° F.) it will be found necessary to increase the cooking temperatures to bring about the desired body and texture.

(*b*) It is imperative to use a pure starter culture to give clean acid development. A contaminated starter culture will result in unclean and "off" flavours in the resultant product.

Common Defects in Cottage Cheese.

1. *Weak and Mushy Body.*—This is due to too high a moisture content in the cottage cheese brought about by the following:—(*a*) Cooking at too low a temperature; (*b*) cooking too rapidly after cutting or breaking the curd.

2. *Dry, Harsh Body.*—The following are the chief causes of this defect:—(*a*) Too high a cooking temperature, which results in too much moisture being driven out of the curd and the curd being firmed up too much; (*b*) too long a cooking period at too high a temperature which gives the same result as in (*a*).

3. *Sour, Overacid Flavour.*—This is usually allied with weak and mushy body and is exaggerated by the following:—(*a*) Too rapid ripening (too much starter) or too high an acidity at breaking or cutting; (*b*) not allowing the whey to drain completely from the curd at wheying off; (*c*) cooling water added to curd too soon, which firms the curd particles and prevent the complete escape of the whey.

Although cottage cheese is not in general use in Australia as a food stuff, there is some demand for it in certain localities. Its manufacture serves a very useful purupose in so far as the cream is available for manufacture into butter and the skim milk is utilised for cottage cheese, thus giving the factory a worthwhile return. This kind of cheese is used as a savoury, but can also be served as a sweet in conjunction with stewed fruits, &c., and provides a valuable source of readily available proteins.

Hand Feeding Dairy Stock on the Darling Downs.

W. J. PARK.

THIS article is not intended to cover the technical aspects of feeds and feeding, but to give a practical example of what can be done by supplementary feeding in a dry time, and is being done on the property of Mr. G. Armitage, of Yargullen, near Oakey.

Before giving particulars of hand feeding as carried out by Mr. Amitage, the following points should be considered:—

1. No supplies of green feed were available on the farm until 18th July.
2. Supplies of dry feed in grass paddocks were rank and coarse, because of abnormally heavy rainfall early in the season.
3. The only farm-grown feeds were some wheat and grain sorghums which were valued at ruling market rates.
4. All other feeds used (viz., oaten hay, wheaten hay, milo, barley and wheat) were purchased on a high market.
5. Suitable lucerne chaff and protein concentrates could not be bought when required and the best use had to be made of available feeds.
6. The grain was fed in the proportion of 3 parts grain sorghum to 1 part barley, and was fed with wheaten and oaten chaff. (Mr. J. Zerner, manager, Yargullen Cheese Factory, assisted with the working out of rations.)
7. All stock were fed twice daily with nose bags, as feeding stalls had not been erected on the farm.
8. Hand feeding started on 13th May when the milk supply had already dropped to half the peak production. It should have been started at least one month earlier.
9. At the commencement of the feeding trials 24 cows were in milk; 16 had been milking five months or longer; and six came in fresh between 13th May and 1st July, giving a total milking herd of 30 cows, which may be considered an average herd for that time of the year.

Table 1 shows the decline in the monthly milk supply reviewed at the factory from February to June, 1944.

TABLE 1.

1944	February	March	April	May	June
Gallons of milk	49,161	43,007	26,093	17,286	17,280

Milk Supplied to Factory by G. Armitage from 1st April to 21st July.

Table 2, which is self explanatory, gives the average daily quantity of milk supplied by Mr. Armitage for weekly periods, comments re feeds, feeding costs, factory pay, and tests. All stock were hand milked from the start of feeding to find which individuals responded better to hand feeding. All details of gallons of milk received, butterfat tests and payout have been taken from the factory books.

TABLE 2.

Period of Time	Average Daily Milk Supply in Gallons	Weekly Butterfat Test	Factory Pay	Feeding Cost	Remarks
April.					
1st–8th ..	36.5	Average 4·4	..	..	No green feed. Grazing in dry grass paddocks
9th–16th..	32·1		..	..	
17th–24th	29·2		..	..	
25th–30th	24·1		£49 8 0	Nil	
May.					
1st–8th ..	22·5	4·2	..	..	No green feed. Grazing in dry grass paddocks; started hand feeding 13th May. Fed twice daily before milking
9th–16th..	22·0	4·2	..	..	
17th–24th	28·8	4·1	..	..	
25th–31st	28·1	4·2	£38 7 8	£18	
June.					
1st–8th ..	38·6	3·9	..	..	No green feed. Grazing in dry grass paddocks. Grain ration increased 50 per cent. on 1st June
9th–16th..	38·3	3·9	..	..	
17th–24th	40·7	3·8	..	..	
25th–30th	43·7	3·7	£61 10 0	£28	
July.					
1st–8th ..	44·1	3·6	Estimate £82	Estimate £25	No green feed. Grazing in grass paddocks. Started on green feed on 18th July when hand feeding was reduced to 50 per cent. grain ration only.
9th–16th..	51·4	3·6			
17th–21st	56·0	..			

Daily milk supply reached 60 gallons on 21st July, 1944.
Average factory test dropped from 4·1 in April to 3·6 in July.

Lessons from this Example of Supplementary Feeding.

Very little hand feeding was carried out during the recent dry spell. Its effects, so far as the producer was concerned, were twofold:—

1. The loss of production at the time of the dry spell. This resulted in numbers of cows being dried off after milking from 4 to 6 months only.
2. When supplies of green feed became available the stock were in poor condition and unable to show an immediate increase in production. In fact, in many cases they will not reach the production they would have attained if they had not been underfed in the dry spell.

From the viewpoint of factory operations the effects were also twofold:—

1. Reduced supplies to the factories resulted in increased manufacturing costs per lb. of cheese.
2. Apart from the reduced supplies due to the dry season there was also a lowered yield of cheese per lb. of butter fat, as the compositional quality of milk, especially non-fatty solids, was adversely affected by the low nutritional level of stock feeding, in the period referred to.

If controlled hand feeding had been carried out by all suppliers to the Yargullen factory, and allowance made for the normal decline in milk supply (not due to seasonal conditions) it is estimated that the

monthly milk supply to the factory could have been 35,000-40,000 gallons of milk for April, May and June, instead of the actual amounts received as shown in Table 1.

In regard to hand feeding a warning must be given that haphazard feeding does not pay and the practice of throwing quantities of hay on the ground for stock to trample and waste is uneconomic.

Conclusions.—If hand feeding had been adopted generally by suppliers, their returns would have been benefited in a fourfold manner:—

1. By an increased yield of milk during the period involved.
2. By an increased yield when the season broke due to stock being in good condition.
3. By an increased price per lb. for butter-fat due to the lowered factory costs.
4. By an increased yield of cheese per lb. of butter-fat, because of the effect on cheese yielding capacity of milk from cows on an adequate diet.

Some Notes on Breeding.

S. E. PEGG, Dairy Inspector.

ALL dairy farmers need some knowledge of the principles of breeding. The four basic laws of breeding are:—

1. *Mendel's Law of Heredity.*—This law was propounded by the famous Austrian monk, Mendel, who was the pioneer in scientific studies on breeding. Mendel, working with peas, proved that there were definite laws of averages operating in respect of the transmission of characteristics from parents to progeny. The science of animal breeding is bound up with complex studies in cell structure, living matter, and germ cells in reproduction, but a simplified version of portion of Mendel's theory is that for the consideration of breeding an animal or plant must be regarded as representing a collection of characteristics and that:—

(*a*) Each characteristic is controlled by one or more determiners;
(*b*) Each determiner is composed of two factors;
(*c*) At the time of mating (conception) one factor of each determiner is obtained from each parent.

It is generally believed that at each mating the sire and the dam play an equal part in determining the make-up of the off-spring. Of course, if one parent is much superior—e.g., the sire, in the mating of a pure-bred, production lineage bull with a scrub cow—it will probably stamp its desirable qualities noticeably on the off-spring. Such an animal is then said to be *prepotent.*

The characteristics of the individual are thus determined at the time of conception. After the female cell has been fertilised by the male cell, nothing but food enters the fertilised egg and the character of the developing embryo has already been determined by the factors and determiners contributed by the parents. The extent to which the progeny will develop in accordance with its inheritance may, however, be conditioned by environment. That is, the condition under which the animal is kept as regards climate, feed, and care may enable it to develop or produce to its inherited capacity or otherwise.

Examination of large numbers of records has shown that on the average, the parents contribute 50 per cent. of the genetic make-up of an individual, the grandparents 25 per cent., great-grandparents 12½ per cent., and the influence of each generation is one-half of the generation which precedes it.

2. *Law of Like Begets Like.*—This implies that the offspring will resemble their forebears in their physical and other characteristics. It is used as the foundation of improved breeding, but the offspring will always vary to some degree from the parents, the extent of this difference being chiefly governed by the uniformity of type, proportion of purity of blood in parents, closeness or otherwise of relationship of parents, and so on.

3. *Law of Variation.*—As stated, no two individuals are ever exactly alike; variation is ever present. This variation may be one of two kinds:—

(*a*) Congenital variation: This is, born in the animal, a variation transmitted from parents to offspring. It is largely accounted for by the inheritance from antecedents other than the parents. By a process of judicious selection and breeding from desirable variants, new breeds possessing distinctive characteristics may be founded.

(*b*) Acquired variation: This differs from congenital or inherited variation by resulting from environmental factors, like climate, feeding, and care. For instance, as stock become better bred it is essential for improved feeding to accompany the breeding practices, or the stock will deteriorate. Acquired variation is thus considered not to be capable of being passed on from one generation to another.

4. *Law of Atavism.*—This law refers to the tendency for animals to revert in resemblance and other qualities to remote ancestry. The resultant individual is often referred to as a "throwback," and the phenomenon is known as *reversion* or *atavism*. As there has been a steady improvement in the breeding of stock a "throwback" is generally an inferior animal. An example of atavism is seen in the occasional appearance of small horns in polled breeds.

Systems of Breeding.

1. *Pure-Breeding.*—Where animals have been consistently bred for many generations with some fixed ideal in front of the breeders, it is found that most of the characters become fixed and are transmitted with practical certainty. When this stage is reached, a pure breed has been established. Amongst pure breeds, however, variations are still found, the variations being limited to the group of characteristics belonging to the particular breed. As a result of the careful operations of different breeders, *strains* or *families* are developed within each pure breed. Improvement within pure-bred stock is effected by means of selection within the breed. In other words, it does not necessarily imply because an animal is pure bred that it is of high quality. Once started on one particular type or strain inside any breed, it is necessary for the stock-owner to continue to build up on that strain, especially by pursuing a course of line breeding, and only introducing an outcross (entirely unrelated strain) occasionally when it is desired to introduce some new character. After this outcrossing, line breeding is again resorted to. By a policy of going to different breeders for unrelated sires to mate with each generation of females, outbreeding is being constantly followed

and it is not possible to establish a uniform herd; in other words, the genetic make-up becomes mixed. Uniformity of type is attained by following line-breeding within the favoured strain.

In pure breeding there are recognised systems according to the degree of relationship within the breed of the animals being mated. These are—(*a*) in-breeding, (*b*) line-breeding, (*c*) out-breeding or out-crossing.

(*a*) *In-breeding* is the mating of closely related animals; e.g., son to mother, father to daughter, brother to sister. The object is to secure uniformity and to rapidly fix some desired characteristics. However, in-breeding will also rapidly bring out any faults and, because of this, can only be used by breeders who are intimately acquainted with the ancestry of the stock and are prepared to cull drastically. It is too dangerous a system for the ordinary stockbreeder to pursue.

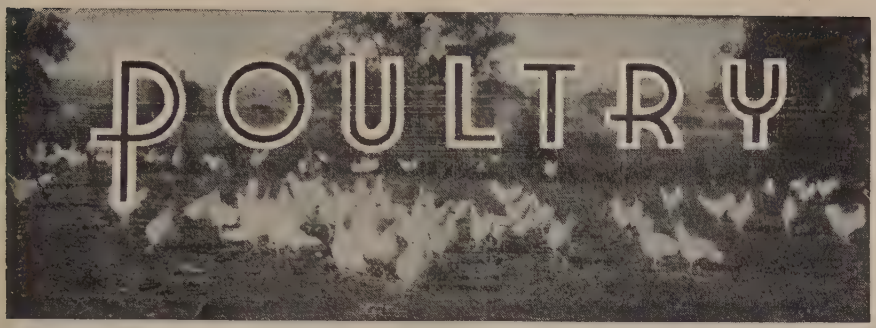
(*b*) *Line-breeding.*—This depends on the breeding from animals of a single line of descent. It is really a modified system of in-breeding in which the relationship is more distant; not nearer than cousins. It secures uniformity of type and enables the fixing of desirable qualities in a relatively short period without the risks inherent in in-breeding. In line-breeding the breeder should know the characteristics of the animals and all stock being bred should be carefully selected after a personal examination. It is not satisfactory to buy on a pedigree alone.

(*c*) *Out-breeding or out-crossing* is the term used to describe the mating of pure-bred animals of different strains or bloodlines. The judicious introduction of an outcross is advisable in a herd being linebred when it is desired to introduce some new character. After this outcross line-breeding is again resumed.

2. *Cross-breeding.*—A crossbred is the progeny of the mating of parents of two distinct purebreeds—e.g., A.I.S. bull and Jersey cow. Although cross-breeding is commonly followed with certain stock—e.g., to produce fat lambs and in pig raising—it is not recommended in dairy herds. The first cross may possess all the dominant features of each breed and be a superior animal, but even for meat animals cross-breeding should always stop at the first cross, as cross-bred animals, when mated, will not transmit desirable qualities.

3. *Grading-up.*—This is the system of breeding advocated for the improvement of ordinary commercial dairy herds. It requires the use of successive pure-bred sires of the same breed on cows selected from common stock. In grading-up a dairy herd, a start is made by mating indifferent female stock with a pure-bred bull of the breed selected. The female progeny of the first mating are then mated with a pure-bred bull of the same breed and the process continued on through successive generations. If inferior females are gradually culled, and improved production sires are successively introduced, the herd will, within three or four generations, have attained a uniformity of appearance similar to pure-bred stock and their production will have been considerably improved. A high-class grade herd is capable of producing just as well as a good pure-bred herd.

Irrespective of the system of breeding followed, success can only be achieved by the rigid culling of animals not up to standard as regards type, constitution, production, and fecundity. It is equally necessary to provide adequate feed at *all* times to ensure that stock will develop and yield to their inherited capacity.



Diseases of Chickens and Growing Stock.

L. G. NEWTON, Veterinary Officer.

WITH the rearing season now in progress, it is appropriate to warn poultrymen to take every precaution against the many diseases which cause heavy losses each year amongst chickens and growing stock.

Disease will occur in all poultry yards at some time or other, but if control measures are immediately put into operation an otherwise serious loss may be prevented. If the disease is not recognised, the best procedure is to seek advice from the Department of Agriculture and Stock or submit one or two live birds showing typical symptoms to the Animal Health Station, Yeerongpilly, for examination.

Pullorum Disease.—When heavy mortality occurs in chickens up to 10 days old, pullorum disease should be suspected. Its presence, however, can only be confirmed by laboratory examination and three live or freshly dead birds should be submitted at once to the Animal Health Station for this purpose. There is no treatment and it is therefore essential to know whether the disease is present or not so that the survivors can be either destroyed or reared away from other birds and later blood tested. If the farmer is breeding his own chickens, he should arrange for a blood test of the breeding stock, and if not, insist that chickens which are purchased are from blood tested stock and hatched under conditions free from infection.

Coccidiosis.—Coccidiosis usually occurs at from 3 to 10 weeks and accounts for more deaths than any other disease of growing stock. The affected birds become pale, lose condition, and huddle together with ruffled plumage, and the wings drooped to the floor. Blood may be passed in acute outbreaks.

The most effective control measures consist of strict attention to sanitation. Cleaning the pens every 24 hours is necessary in acute cases. To facilitate cleaning, each unit should be of convenient size., e.g., 100-250 chickens. A light covering of litter, e.g., wood shavings, will assist in drying out moisture in the droppings and, at the same time, prevent the droppings from sticking to the floor. The inclusion of milk in its various forms in the ration is beneficial. A suitable mixture can be made up of milk 40 parts; maize meal, 50 parts; bran, 10 parts. Although many medicinal treatments have been prescribed, their value

is limited and, if used, they should be combined with measures of sanitation. Every effort should be made to anticipate the outbreak and apply immediately the most intensive methods of control.

Fowl Pox.—Fowl Pox occurs in practically all parts of the State where poultry are kept. It may take one or a combination of several forms. The commonest is the appearance of wart-like growths on the unfeathered parts of the head; cheesy masses may occur in the mouth and throat, or a catarral condition of the eyes and nostrils accompanied by discharges may be seen. Provided that the birds are otherwise healthy the disease usually takes a mild course, most cases simply showing a few warts and recovering quickly.

Where time permits, dressing the unfeathered parts of the head three times weekly with 10 per cent. carbolic ointment will prevent the spread of warts and repel mosquitos which act as spreaders. Complicated cases are better destroyed and burnt. Where the disease occurs annually, the vaccination of all young stock is recommended as a means of prevention.

It must be stressed, however, that only healthy birds should be vaccinated; vaccinating unthrifty birds or those suffering from any obvious disease is only courting trouble. It is also important to remember that if a portion of the flock is vaccinated, the disease may occur in a severe form in the remainder of the young birds. It is essential, therefore, that all young birds be done.

Deficiency Diseases.—Another disease generally classed under the heading of roup is due to Vitamin A deficiency. Affected birds are pale, particularly the yellow pigmented breeds, and in typical cases white pustules appear in the gullet and the kidneys have a frosted appearance. It can be prevented by feeding Vitamin A rich foods, e.g., cod liver oil, green feed, lucerne chaff, and yellow maize.

Deficiency of riboflavine (one of the vitamin B factors) has occurred in chickens of 3-6 weeks of age during the past two years. The toes are curled in and the birds move about on their hocks. This condition can be effectively treated by the inclusion of liver, liver meal, bran, milk, &c., in the ration.

Worm Parasites.—Worm parasites often assume pathogenic importance, particularly where chickens are being reared semi-intensively or on unspelled ground. Treatment in these cases should be applied promptly, the most satisfactory method being a flock administration of nicotine sulphate at the rate of ½ c.c. per 1 lb. of food daily for four to six days. This drug is in short supply at present, but can be obtained by making application to the Poultry Branch of the Department. To treat the birds, calculate the amount of mash required by each pen for the day and measure accurately the amount of nicotine sulphate to be added on the basis of ½ c.c. per 1 lb. of food. Add this to half a cup of water, rub through a handful of bran and mix thoroughly through the mash. Treatment is of little value, however, if the birds are returned to dirty pens afterwards. They should be given new or spelled ground and failing this the pens should be thoroughly cleansed and disinfected.

Hatchery Hygiene.

P. RUMBALL.

IN the control of pullorum disease fumigation of the incubator is practised by many, but often little or no consideration is given to the possible presence of other diseases. Where blood testing of the breeding stock has been done, many do not even fumigate. A disease that is not at all uncommon among very young chickens is *Omphalitis*. This disease may be contracted within the incubator, especially when the navel is not closed and infection is present.

Incubator hygiene cannot be well conducted without due consideration being given to the cleanliness of the incubator room, for any infection within the incubator can be conveyed to the room in the fluff and material that is distributed through the vents of the incubator, and in the process of taking hatches off. There also is the possibility of chickens contracting infection in chicken boxes, consequently hatchery owners or operators should be particularly careful to see that this possibility is reduced to a minimum by the use of new packing material for each lot of chickens, and the thorough cleansing of chicken boxes which have to be re-used. Therefore, sound hygienic practice has to be observed in the room, the incubator, and the chick box.

The Incubator Room.

The cleansing and disinfection of the incubator room should not be left from the end of one season to the beginning of the next. In a well managed hatchery cleansing and disinfection is almost a daily practice. Cleansing should not be restricted to the inside of the incubators and the floor of the room. Walls, ceilings, shelves, and the tops of the incubators all collect dust and fluff, probably carrying infection. The material which lodges on such surfaces, usually so very light, may be again circulated within the room by the slightest air current; therefore, the floors, walls, shelves, and other places of lodgment should be frequently freed of this dust and fluff and the floors washed and disinfected.

Cleansing the Incubators.—After the removal of the shells and dead embryos from the egg tray, the dried and caked excreta and other material should be scraped off. The egg trays should be immersed in a disinfectant solution of sufficient strength to kill germs and then scrubbed clean. In machines having a separate hatching compartment the fluff should be removed, dried material adhering to any part scraped off, and the whole interior thoroughly washed with a disinfectant solution. Disinfection cannot be thorough without the removal of adhering material. With all types of machines, immediately on opening them up fluff becomes disturbed. This should be cleaned up early to prevent its widespread distribution and possible reinfection of the machine.

In incubators without a separate hatchery compartment, as much fluff as possible should be removed after each hatch and the interior of the machine cleaned thoroughly. Egg trays should be treated thoroughly in the way already recommended.

The need for cleansing and disinfection cannot be over-emphasised. Infection may be carried into the machine on the shells, while within the egg organisms which cause disease, such as pullorum disease, may

be present and are consequently distributed when the infected eggs are hatched. The newly-hatched chicken contracts these infectious troubles by inhalation of infected material, or through an imperfectly closed navel. Cleaning and disinfection reduce to a great extent the possibility of infection.

Fumigation of the Incubator.—Fumigation is a method of disinfection practised by many, but one that, again, is perfected by a thorough cleansing and scrubbing. The most common is formaldehyde and potassium permanganate, the quantity used being in direct relation to the size of the incubator.

To fumigate a room of 1,000 cubic feet capacity, 8 ounces of formaldehyde and 4 ounces of potassium permanganate are necessary. If the incubator (inside measurement making no allowance for egg trays, &c.) is 10 feet by 5 feet by 2 feet the space to be fumigated would be 100 cubic feet; therefore, only one-tenth of 8 ounces of formaldehyde and one-tenth of 4 ounces of potassium permanganate would be necessary. The quantities should be exact to be efficient, and the machine should be run at the normal temperature and humidity kept high. The procedure recommended is as follows:—Place the potassium permanganate in a pan about 2 inches deep, heap it up and hollow out the centre. Place the pan in the incubator and then pour into the hollowed centre of the permanganate the formaldehyde, after which quickly close the door.

Fumigating while eggs are in the incubator is done in the same way, but the fumigant should be removed within 15 minutes. It is best applied when eggs are at the end of the 18th day of incubation and are placed in the hatching compartment. Although the gas will destroy germ life, it has little effect on the chicken, and fumigation may safely be done although an odd egg or two may have chipped. In machines without a separate hatching compartment fumigation may be practised once weekly.

Fumigation when the hatch is advanced is not recommended.

Plate 44.

Merino Flock on Kindon, near Goondiwindi.

ANIMAL HEALTH

Scours in Calves.

L. G. NEWTON, Veterinary Officer.

IN Queensland, it is a common practice to rear dairy calves from birth to 3-4 months of age in small, bare, permanently-occupied pens or small paddocks, feeding being more or less routine farm work. Under these conditions scours frequently occur; in fact, from the number of inquiries made at the Department, this is easily the most common disease of young dairy calves and must cause a large number of deaths in the course of the year. What is even worse, those cases which recover remain unthrifty and stunted.

Types of Scours.

Nature intended the digestive system of young calves to be able to cope only with small amounts of milk taken at frequent intervals. Consequently, over-feeding, irregular periods between feeds, sudden changes of feeding, or too rich milk may bring about a severe digestive disturbance with subsequent scours.

When suckling the cow, the milk is taken in slowly and in small amounts. When it reaches the stomach the secretion of this organ causes curdling, but the curds are small in size, and, therefore, easily digested. When bucket-fed, however, say twice daily, the milk is swallowed quickly and a large mass of curd is formed which overtaxes the digestive system. Similarly, if the milk becomes cold before feeding, much of it may pass into the paunch where it cannot be digested and simply sours. Fat is the most difficult constituent of milk to digest and too-rich milk —i.e., over 3·5-4 per cent. butter-fat—may upset the digestion.

Thus incorrect feeding is often responsible for simple diarrhœa, but, more important, it predisposes the calf to the more severe and often fatal form of white and blood scours due to bacterial infections.

Source of Infection.

It is well known that within the bowel there are countless bacteria, some of which are useful in assisting in breaking down food material; others which are harmless; and others which, while they do not cause harm ordinarily, become pathogenic under favourable conditions. Thus, when the calf's digestion is upset and it becomes weak, these organisms quickly multiply, cause irritation and inflammation of the bowel, and, as a result, diarrhœa or scouring follows. The dung passed teems with organisms.

Similarly, older animals which have recovered from an attack of scours pass out the organisms in their dung for some time and, consequently, the pen becomes heavily contaminated, so that each calf placed

in the pen may be subjected to severe infection from birth. It is obvious, therefore, that the permanently-used calf pen is a constant source of infection for new calves.

Again, some newly-born calves have an imperfectly closed moist navel. This area is particularly prone to infection and should the calf be placed in infected pens infection quickly enters by this route and symptoms may develop within a few days.

Effects.

The effects of scours are well known and require only a brief description. Calves may be affected within a few days of birth. They refuse to suck, appear sick, and diarrhœa gradually develops, the motions becoming gradually more moist until they are liquid, greyish white and foul smelling. The calf may become prostrate and die.

With older calves, the onset is rather slower, the calf at first not drinking as well as usual. As the disease progresses, the appetite decreases, the sides are tucked up, the eyes are sunken and dull, the ears droop, the nose is dry, and the animal lies on its chest or side groaning, grinding its teeth and straining. The scour is now liquid, dirty grey, and foul smelling in the case of white and red in the case of blood scours. The calf may survive for two or three weeks with white scours, but death is usually rapid with blood scours.

Complications such as pneumonia and swelling of the joints frequently occur especially in calves affected soon after birth.

Prevention.

As many calves die each year and those which recover are stunted, every effort should be made to prevent the disease occurring; and there is no doubt that where vigorous precautions are taken to prevent it, the disease can be controlled by correct management. The following principles are set down as a guide:—

1. Examine the navel of each new-born calf immediately it is brought into the yard. If moist, the stump should be swabbed with strong iodine.

2. Calves should be reared in clean surroundings. If small pens are necessary to confine the calves for convenient feeding, the floors should, preferably, be of concrete. The calves can be kept on this for a full fortnight and then given the run of a grass paddock and brought in only for feeding. When it is not possible to put down concrete, plough up the pens regularly and, preferably, make two pens which can be used in rotation.

3. Young calves should be kept away from older ones as far as practicable. Apart from knocking the small ones about, the older calves may carry infection which is spread to the younger calves.

4. Observance of the following cardinal points in feeding is most important:—

(*a*) Always allow the calf its mother's colostrum. This is essential, because the milk contains substances which increase the resistance of the calf to scours and other diseases.

(*b*) Feed the correct amount—i.e., 1 lb. of milk to each 10 lb. body weight per feed.

(*c*) If it can be arranged, feeding may be spread over three or four periods daily, but it is better to give two regular feeds than more feeds haphazardly.

(*d*) The fat content should not be higher than 4 per cent.

(*e*) Use lime water as a routine measure for all calves. Commence with two tablespoonsful and gradually build up to half a pint per feed.

(*f*) Make changes from whole to separated milk gradually. The onset of scours often coincides with the change-over, indicating that it has been made too suddenly, upsetting digestion and precipitating the outbreak of the disease which might otherwise have been withstood.

(*g*) Feed at the correct temperature—i.e., blood heat.

These recommendations are set out more fully in the December, 1943, issue of this Journal and should, if possible, be read in conjunction with it.

Treatment.

Since scouring may be due to many causes it is only possible to prescribe the following general symptomatic treatment until the specific cause has been identified by clinical and laboratory examination:—

(*a*) Immediately scouring appears, isolate the calf and dose with 2-4 oz. of castor oil. Starve for twenty-four hours.

(*b*) The first feed following this period should be made up of half of the quantity of milk previously used, with an equal amount of lime water. Warm up to blood heat before feeding. As the calf recovers gradually return to normal feeding.

(*c*) If scouring does not cease add a teaspoonful of chlorodyne to each feed.

If recovery does not seem likely at the end of a fortnight, it is advisable to kill and burn the animal.

When a dairy farmer has had repeated losses of calves from scours, he should contact the nearest veterinary officer or inspector of stock with a view to having the animals examined and, if necessary, the appropriate specimens submitted to the Animal Health Station for laboratory examination. When the cause is established, more definite and specific treatment can be given. This is important, because worm parasites are often the cause of scouring in which case the treatment set out above would be or no value.

Contagious Abortion *(Brucellosis)* of Cattle.

M. R. IRVING, Veterinary Officer.

Economic Importance.

LOSSES caused by brucellosis of cattle on the Darling Downs far exceeds those of any other disease of cattle, with the possible exception of contagious mastitis. It is impracticable to compute with accuracy the economic loss caused by this disease. The reduction in milk yield due to sterility, premature calving, or prolonged sickness associated with abnormal parturition; the high mortality rate and unthriftiness of newborn calves; and the serious disruption of stud breeding all add up to a considerable annual loss to the industry.

The milk yield of cows infected with brucellosis may be 20 per cent. lower than that from similar healthy animals, even though the infected animals may not abort.

Cause.

Brucellosis is a contagious disease caused by a specific micro-organism and is quite independent of, and unrelated to, another common disease of reproduction, contagious vaginitis. This fact is not generally realised by farmers and much expense is fruitlessly incurred by them in attempts to treat both diseases in the belief that they are identical. The chief sites in the body of the causal organism of brucellosis are the uterus (womb) and the udder. An infected cow will therefore discharge vast numbers of disease-producing organisms in the after-birth, uterine discharges and milk. This occurs in all diseased cows, whether they have actually aborted or calved apparently normally.

Mode of Infection.

The organisms which have been thus distributed about the bails and yards, water troughs and on the pasture, gain entry to other healthy animals by way of the mouth. This is the main channel of infection. Cattle grazing on discharge-contaminated feed or licking infected cows when "bulling" are dangerously exposed to infection. The common belief that the bull is responsible for spreading the disease is unfounded as, in spite of many experimental attempts, it has not been possible to transmit brucellosis by service. Although service is a mu less common source of infection than is the eating of contaminated feed or pasture, a dairy farmer would be very unwise to allow an infected bull to serve his cows, as transmission possibly does sometimes occur in this way. On the other hand, flies which have fed on an infected after-birth may carry the disease to healthy animals by depositing germs in their eyes, from which the organisms are readily absorbed into the bloodstream.

Being so highly contagious, brucellosis spreads very quickly through a herd and is often well established, with a high percentage of infected cows, before the owner is aware of its presence. It is this fact which demands that owners should be quick to recognise evidence of the disease and equally quick to confirm suspicions by the application of a test. Once evidence of infection is established the immediate institution of control measures is imperative.

Symptoms.

The symptoms which follow infection with the organism of contagious abortion vary considerably in different animals. Abortion of the foetus (developing calf) is the most spectacular symptom and is easily recognised. This usually takes place in the latter half of the period of pregnancy. Abortion (of the foetus) may also occur from other causes not connected with the disease; however, brucellosis is by far the commonest cause of abortion, so that all abortions should be regarded as due to this disease unless blood tests have proved that the disease is not present; if abortions are frequent or occur in a wave then brucellosis should be strongly suspected. One thing which masks the presence of the disease in a herd is the fact that many infected cows never abort, but are more liable to suffer from retained after-birth, sterility, and irregular breeding habits, which all lead to a considerable reduction of milk supply. Such unreliable symptoms, therefore, do not offer a very safe basis for making a diagnosis of contagious abortion unless they are so widespread in a herd as to make profitable production impossible. It is most desirable that a sound diagnosis be made long before the disease has reached such serious proportions.

Diagnosis.

If an owner suspects an animal of being infected, he should isolate the suspect from the rest of the herd and collect a blood sample and send it direct to the Animal Health Station for testing. This prompt action will avert any delay which might occur in arranging for a test of the whole herd. Should the animal prove positive, it is obvious that an early test of the whole herd is essential in order to forestall further spread of the disease. If the result is negative, a careful watch should be kept for any future evidence. Failure to take this simple precaution has resulted in many herds becoming so heavily infected that elimination of the disease is little short of disastrous to the herd which may have been carefully built up over many years.

Another fatal mistake so frequently committed in the past by dairy farmers is the refusal to acknowledge obvious clinical evidence of the disease and the misguided resort to all sorts of expensive "quack" medicines which purport to cure every disease of livestock, including abortion. Many dairy farmers have tried all sorts of patent remedies over periods of several years, during which the disease has become more firmly established in the herd. Unfortunately for them, it is a fact that most animals which contract the disease abort but once only, and afterwards carry their calves apparently normally. This deception of nature has cost many dairy farmers dearly by leading them to the false conclusion that the remedy was having at least partial success. These cows may give birth to a normal calf, but the discharges and after-birth teem with germs and so spread the infection.

Agglutination Test.

This test offers the only means of detecting infected animals, particularly those which have failed to reveal themselves by aborting, but which, nevertheless, are potent sources of infection for healthy animals in the herd. This agglutination test, as it is called, is carried out at the Animal Health Station, Yeerongpilly. All that is required for the test is the taking of a sample of blood from each animal in the

herd (about half an ounce of blood from each) and sending them by the quickest means to the laboratory. The test is carried out free of charge to the dairy farmer.

The technique of the test is complicated, but it would suffice to say here that it depends on the biological fact that in the blood of all animals affected with brucellosis there are certain combative properties which have been developed by the animal to fight the disease organisms, but which have not been developed in the blood of a healthy uninfected animal. The test is designed to detect this property by delicate bacteriological procedures.

The Collection of Blood Samples.

The collection of blood samples is a simple matter, if proper facilities are available. The best conditions are provided by the old type sword bail which holds the animal firmly by the neck. This bail may be in the milking shed or in a convenient crush. The walk-through type of bails are not as convenient or easy to work in. With the sword bail the head of the animal is held stretched forward and a cord is passed round the base of the neck in the form of a noose. When this is drawn tight, the jugular veins on each side stand out prominently. A strong clean hypodermic needle is inserted through the skin into the vein in a forward direction and the stream of blood collected in sterilised one-ounce bottles. The bottles are each labelled so that they can be identified with the animals from which the samples were taken, and the samples are allowed to stand undisturbed for a couple of hours so as to ensure firm clotting of the blood. They should then be despatched by the speediest means to the Animal Health Station. Results are usually available within a week.

Control Measures.

1. *Test and Slaughter.*—Consists of the simple but drastic measure of testing the herd and selling for slaughter all animals found by the blood (agglutination) test to be diseased. The sooner testing is applied the less will be the losses incurred.

All animals of breeding age (twelve months and over) are submitted to the test. Positive reactors must be segregated immediately from the herd and disposed of for slaughter as soon as practicable. Delay in disposal of reactors only leads to disappointment, as healthy animals are liable to contract the disease from the reactors which remain in the herd.

Where reactors are found, re-testing at intervals of not more than forty days until no reactors remain is essential for successful and efficient eradication. The reason for this is that the last batch of reactors may have left infection behind them in the herd, and the longer these new cases are allowed to remain undetected in the herd the greater is the risk of their aborting and distributing infection to other animals. By quick repeated tests, all fresh cases are detected before they have an opportunity of replenishing the sources of infection, so that in a matter of a few months the original sources of infection shall have died out. Unless testing is carried out on these lines, it will fail to achieve its object of speedily eliminating the disease with a minimum of loss. The principle, therefore, is the re-test at intervals of not less than one month,

but certainly not more than two months. Once a clean test has been obtained, a second test at a similar short interval is advised, just to make sure. If again clean, the interval may be extended to six months and, later, to a year with safety.

It should be realised, of course, that a herd which has been freed from infection remains clean only as long as it is maintained free of contact with untested cattle. Special care in this direction is necessary, with special emphaisis on precautions to be taken in introducing new animals to the herd. Cattle should not be introduced into a clean herd, or one undergoing eradication before being tested. As an added precaution, it is wise to insist on two negative tests with two weeks between tests. Any relaxation of measures adopted to prevent the reinfection of the herd may lead to a fresh outbreak of disease and the undoing of much expensive work.

The benefits arising from the eradication of brucellosis from dairy herds are undeniable. Higher production, more calves, less sterility, reduced maintenance costs, increased sale value of animals and safer milk are only a few of the more obvious advantages. On these grounds, testing and eradication are to be strongly recommended.

In some countries vaccination in various forms has been extensively practised; but the success of vaccination has been so variable and in some cases so disappointing, that its adoption here is not likely to be sanctioned until it has been developed to a stage where its merits are undisputed and reliable. In the meantime, testing is the only means of successfully combating the disease.

2. *Hygiene and Management.*—Certain other measures should be adopted in conjunction with testing and disposal of reactors. When the testing programme is under way, sometimes in the interval between tests, a cow will abort. It is essential that this cow be isolated at once and a blood sample sent in for test. The aborted foetus and all afterbirth and discharges should be collected if possible and burnt. The hindquarters of the cow should be washed down thoroughly with a disinfectant solution to destroy any germs that may be present. One negative test is not enough to allow the cow to go back into the clean herd. She must give two negative tests, with a month between them, before going back to the herd. Isolation must be thorough and involves the suspected cow being milked in a separate bail, specially erected for the purpose. This means a little trouble but is well worth while if heavy infection in a herd is to be controlled with the minimum delay.

Obtain Veterinary Advice.

When a farmer suspects the presence of contagious abortion in his herd, he should consult a veterinary officer immediately. Unless the problem of eradication is tackled properly from the start with a full understanding of what eradication means and the responsibilities of the owner, confusion and disappointment are sure to follow. Therefore, the veterinary officer should be given the opportunity to explain everything thoroughly and lay down a scheme of control. The rest can then be done by the owner under the direction and supervision of the veterinarian.

GENERAL NOTES

Staff Changes and Appointments.

Under *The Dairy Products Stabilisation Acts*, Mr. August Herman Bulow (Chairman of Directors, Port Curtis Co-operative Dairy Association, Ltd., Gladstone), has been appointed a member of the Dairy Products Stabilisation Board in the place of Mr. C. W. Thiele (Sharon, via Bundaberg), resigned.

Appointments of district inspectors of stock, Department of Agriculture and Stock, have been made as follows:—

Mr. D. A. Logan, District Stock Inspector, Cairns, to be District Stock Inspector, Toowoomba.

Mr. S. J. Monaghan, District Stock Inspector, Cloncurry, to be District Stock Inspector, Cairns.

Mr. A. G. Smyrell, Stock Inspector, Dalby, to be District Inspector of Stock, Roma; and

Mr. E. T. Lewin, Stock Inspector, Boonah, to be District Inspector of Stock, Cloncurry.

The retirement of Mr. H. S. Iliff, Registrar of Brands, Senior Clerk in the Stock Branch, and Registrar of the Veterinary Surgeons Board in the Department of Agriculture and Stock, as from 30th June, has been announced. Mr. Iliff's service in the Department extends over a period of more than fifty years, during which time he has been associated with the growth of the Stock Branch from a small section to its present importance in the pastoral life of the State.

Mr. J. W. Munro will succeed Mr. Iliff as Acting Senior Clerk, Stock Branch, and Registrar of the Veterinary Surgeons Board, and Mr. F. W. Gibney has been appointed Acting Registrar of Brands.

The Minister for Agriculture and Stock (Mr. T. L. Williams) has announced that the increasing activities of the Marketing Section of the Department of Agriculture and Stock and those of the State Executive of the District War Agricultural Committees, has made it necessary to adjust responsibilities in these sections of the Department.

Mr. H. S. Hunter who, in addition to his duties of Director of Marketing, had been carrying out those of State Executive Officer since the inception of the District War Agricultural Committee organisation, will now give his undivided attention to marketing problems which, through the war, have been increasing in volume and complexity.

The approval of the Governor in Council has been given for the appointment of Mr. A. F. Bell, Acting Director of Sugar Experiment Stations, as Acting Director of Agricultural Organisation and State Executive Officer, District War Agricultural Committees, and in his new post he will have control of the D.W.A.C. organisation, part of the duties of which organisation will be to ensure the attainment of production objectives set by the Commonwealth Food Production Executive.

Under the provisions of *The Sugar Experiment Stations Acts*, 1900 to 1941, the following appointments to the Sugar Experiment Stations Advisory Board have been made by the Executive Council for the period from 1st April, 1944, to 31st March, 1947:—

Government Representatives.—Hon. T. L. Williams (Minister for Agriculture and Stock) (Chairman); Dr. H. W. Kerr (Director of Sugar Experiment Stations).

Growers' Representatives.—Messrs. B. Foley (Ascot) and J. A. Winter (Tully).

Cane Sugar Manufacturers' Representatives.—Messrs. J. W. Inverarity (Kalamia Estate, Ayr) and A. V. Thorp (Manager of Moreton Central Mill, Nambour).

State Government Purchase of Agricultural Machinery.

The Minister for Agriculture, the Hon. T. L. Williams, in the course of a recent announcement, said that the initial consignments of agricultural machinery, which had been purchased under the Government's £50,000 purchase scheme, were now arriving in Brisbane. An advisory committee had already made a provisional allotment of this machinery to districts where it could best be utilised in increasing production of food crops. Particulars of this machinery and the terms of its sale or lease had been forwarded to the District War Agricultural Committees, and Mr. Williams advised interested farmers to get in touch with the chairman of their particular district committees.

Allocation of machinery will be made on the basis of the recommendations of district committees. Preference will be given to purchases by co-operative groups of farmers in order to ensure that machines and implements will be used to their fullest capacity. Provision has also been made for sale or lease to approved contractors engaged in farming operations. Sales will be at retail prices and will carry the usual facilities of service provided by the merchandising companies. Mr. Williams further stated that the Agricultural Bank had been officially associated with the scheme and would assist farmers in financing their purchases.

In this first purchase of machinery, particular attention has been given to the needs of vegetable production and the production of fodder for the dairy industry. It includes field and garden tractors, multiple mouldboards and disc ploughs, special types of harrows, planters, power cultivators, power mowers, together with power dusting and spraying equipment, potato planters and diggers, and equipment for harvesting dry-shelled beans, which will be available on lease.

Fruit Marketing Acts—Operation Extended.

An Order in Council has been issued under *The Fruit Marketing Organisation Acts* giving notice of intention to extend the operation of the provisions of such *Acts* for five years from 1st January, 1945, and inviting a requisition of 500 fruitgrowers, as prescribed, for a ballot on the question of such continuance, to be lodged with the Minister for Agriculture and Stock not later than 28th August, 1944.

Regulations have been issued which will provide for the conduct of the ballot, if such becomes necessary.

Sugar Quarantine Area.

A Proclamation has been approved under *The Sugar Experiment Stations Acts* declaring portion of the Maryborough Mill area to be a quarantine area because of the presence of Fiji disease of sugar-cane.

Pigs May be Imported.

An Order in Council has been issued under *The Diseases in Stock Acts* which will permit the entry into Queensland of pigs from New South Wales and Victoria which are consigned to an approved piggery. At present, because of the presence of contagious porcine abortion, the introduction of infected or suspected swine from the Southern States is prohibited, except when certified free from the disease and when consigned to an abattoir, bacon factory, or the Cannon Hill Saleyards for immediate slaughter.

Extending Operations of Broom Millet Board.

An order in Council has been issued under "*The Primary Producers' Organisation and Marketing Acts*, 1926 *to* 1941," extending the operations of the Broom Millet Board for the period from 1st November, 1943, to 31st October, 1949.

Plant Pests and Diseases—Areas Proclaimed.

Under a proclamation issued under *The Diseases in Plants Acts* Pineapple Scale (*Diaspis bromeliæ*, Kerner) has been declared a pest. A further proclamation prohibits the removal of pineapple plants from the Rochedale district because of the presence of pineapple scale, and a regulation declares pineapple scale to be a notifiable disease.

A proclamation has been issued under *The Sugar Experiment Stations Acts* declaring the Tantitha and Avondale districts of the Fairymead mill area to be quarantine areas because of the presence of Fiji disease of sugar-cane.

Wild Life Preservation.

An Order in Council has been issued under *The Fauna Protection Act of* 1937 declaring the property of A. H. G. Macdonald, Bobiberum, Miriam Vale, to be a sanctuary for the protection of fauna. Mr. R. S. G. Macdonald has been appointed an honorary protector of fauna. Mr. H. J. Millword, of Buderim Mountain, has been appointed an honorary fauna protector.

The water reserve on the property of The South Burnett Co-operative Dairy Association Ltd. at Proston, has been declared a sanctuary for the protection of fauna. The manager of the Association, Mr. C. A. Murphy, has been appointed an honorary protector for the sanctuary.

Long Distance Conveyance of First Grade Cream.

Dairy Inspector C. R. Tummon, Mackay, writes:—It is desired to call attention to what may be claimed as a record distance for cream to be sent to a factory. A dairy farmer has supplied cream from Woodstock to the Mackay Butter Factory, a distance of 257 miles by rail, and has almost invariably obtained first grade for it. Woodstock is 23 miles from Townsville on the Charters Towers line, so that all cream had to be transhipped at Townsville. Refrigeration is used to cool and hold the cream on the farm, but, this notwithstanding, it is considered a striking demonstration of just what can be achieved in spite of great difficulties.

Second-hand Fruit Cases.

An amendment of Regulations under *The Second-hand Fruit Cases Act of* 1940 has been approved whereby the second-hand fruit cases committee is empowered, during the currency of a license or any renewal thereof of a dealer in second-hand fruit cases situated in any place outside the metropolitan area, to refund to such dealer any portion, not exceeding one-half, of the license fee paid by him if, in the opinion of the committee, the numbers of second-hand fruit cases dealt with by such dealer have been so limited as to justify such refund.

This adjustment of license fees has been made because of difficulty experienced, in country areas particularly, in obtaining licensed dealers in second-hand fruit cases as the flat rate of two guineas fixed by regulation as the license fee was too high in view of the small turnover of cases in many centres.

Dairy Products Stabilisation Board.

An Order in Council has been approved under *The Dairy Products Stabilisation Acts,* 1933 *to* 1936, appointing Reginald Campbell Duncan (Pittsworth) a member of the Dairy Products Stabilisation Board to fill the vacancy caused by the death of Thomas Dare, of Narko. Mr. Duncan was last week appointed a member of the Queensland Cheese Board in place of the late Mr. Dare, and has now been appointed Cheese Board's representative on the Dairy Products Stabilisation Board for the remainder of the late Mr. Dare's term, namely, until the 31st January, 1945.

Rural Topics

When the Cow Looks for a Lick.

If a lick is needed at any time, it is when the dairy cow is dried off in preparation for its next season of production, The production of a calf naturally takes a heavy toll from the mineral reserves in the cow's system, and if she is to be kept healthy and have a well-developed calf, a suitable lick should be provided for her, so that she might replenish those mineral reserves.

A Rubber "Persuader" for the Trucking Yard.

If there is one about the place, an old motor-tyre tube will make an effective slapper for use when trucking cattle. The tube is cut in sections lengthwise and mounted on a wooden handle. When the rubber whip is slapped on a beast it makes a loud report, which startles the animal and produces the same effect as a painful blow. Examination of slaughtered cattle has shown no bruise or other injury to the carcass through the use of this effective yet gentle rubber "persuader." The use of a rubber slapper prevents a lot of unnecessary bruising in the yard which depreciates the carcass value. It is worth remembering that bruising of beef on the hoof means a substantial reduction of the value of beef on the hook.

The Better Home.

As a topic of the day, the housing problem is among the first priorities, and here is an excellent definition of what a bright country schoolboy said in his winning essay on the subject "A Better Home":—"A better home," he wrote, "is a place my dad is proud to keep going, my mother loves to take care of, and we like to be in. It is a place to grow old in." There's surely a point in that youngster's definition for the planners of the new housing policy we've been promised.

A Cattle Crush on Every Farm.

Apart from milking, any operation to dairy cows performed in the bails always upsets them and makes them nervous for some days afterwards in the bails. Consequently, they acquire the habit of soiling the floors. A crush should be used for all operations of dairy stock except milking, such as the handling of bulls and young stock, testing for tuberculosis, inoculating, and so on. Therefore, a crush should be provided on every dairy farm so as to make the doing of these jobs much easier than they could be done without a crush.

The Weaknesses of the Landlord-Tenant System in Australia.

A committee of experts of the New South Wales Department of Agriculture was appointed recently to investigate tenant farming and it reported that insecurity and instability of tenure are causes of "low production and declining fertility." Field officers are unanimous that the landlord-tenant system is the cause of failure to adopt improved farming practices generally. They say that working under conditions where no compensation is paid for improvements, and where he may be put off a place at short notice, the tenant has no inducement to do otherwise than take all he can from the soil and put as little as possible back. On the other hand, although tenants often receive no compensation for improvements they do, no provision is made to compensate the landlord for neglect or for careless farming.

Most leases are for one year; some for three years; and a few for longer terms. The landlord-tenant system is, these experts say, characterised by failure to use written agreements, to fix rents on an equitable division of farm returns, to encourage the making of improvements, and to pay compensation for improvements. As a matter of fact, tenants are often excluded from any right to compensation for improvements they put on to the rented property.

To get over many existing disabilities and preserve the fertility of the soil, the committee of experts suggests legislation and an educational campaign among both landlords and tenants. A good tenant is worth more than a high rent.

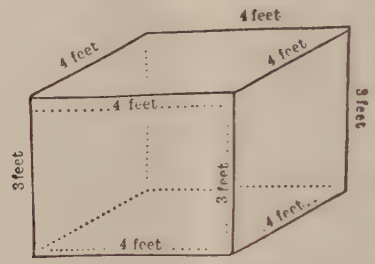
GADGETS AND WRINKLES

Tank Measurements

SQUARE AND OBLONG TANKS.

EXAMPLE 4.

To find the capacity of Square Tanks. Multiply length by breadth by depth.



$4 \times 4 \times 3 = 48$ cubic feet, multiply by $6\frac{1}{4}$ for gallons.

$6\frac{1}{4}$

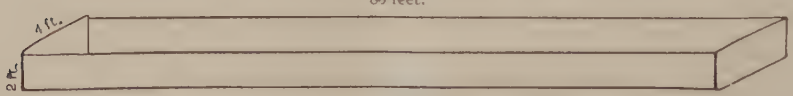
288
12

300 gallons.

The same rule applies to oblong tanks or channels with perpendicular sides. (See next page.)

EXAMPLE 5.

Quantity of earth removed from a channel 80 feet long by 4 feet wide by 2 feet deep,—



Rule—Multiply length by breadth by depth.

$80 \times 4 \times 2$

4

320
2

640 cubic feet.

If wanted to know how many gallons the channel would contain, Multiply 640 cubic feet by $6\frac{1}{4}$.

$6\frac{1}{4}$

3840
160

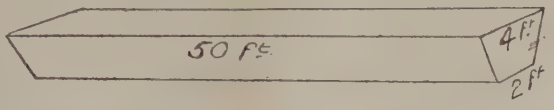
4000 gallons.

To find the number of cubic yards, divide the number of cubic feet by 27; the above channel contains 640 cubic feet.

$27)640(23\frac{19}{27}$, almost $23\frac{3}{4}$ cubic yards.

EXAMPLE 6.

Quantity of earth removed to make a channel 50 feet long 4 feet wide at top, 2 feet wide at bottom, 3 feet deep.



sum of top and bottom width divided by 2, gives mean width.

$4 \times 2 = 6$; $6 \div 2 = 3$ mean width.

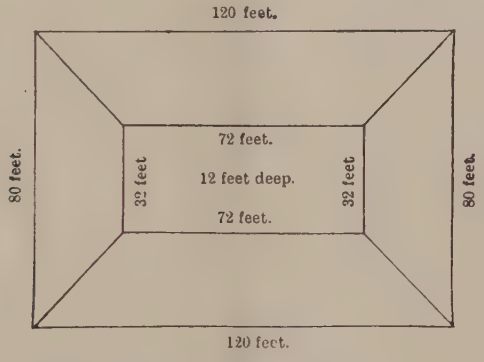
$50 \times 3 \times 3 = 450$ cubic feet.

TANKS WITH SLOPING SIDES.

EXAMPLE 7.

Rule—Multiply length by breadth of top area; multiply length by breadth of bottom area; multiply sum of top and bottom length by sum of top and bottom breadth. Add these three results together, multiply by depth and divide by 6, and you have the number in cubic feet.

Divide by 27 for cubic yards.



Top $= 120 \times 80 = 9600$

Bottom $= 72 \times 32 = 2304$

$192 \times 112 = 21504$

33408

12

6)400896

27{ 3)66816 cubic feet

9)22272

2474-6 } 18

= 2474 cubic yds. 18 cubic feet.

Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

WHEN THE CHILDREN HAVE COLDS.

Do's and Don'ts for Mothers.

MOTHERS—

DO Keep the child's bowels regular and well opened.

DO Keep the nostrils clear.

DO Raise the head and shoulders a little higher than usual in the cot to make breathing easier.

DO Give a good warm bath to open the pores of the skin and then put the child quickly into a warmed bed.

DO Keep the child warm.

DO Give plenty of fluids especially if he is feverish.

DO Rub the chest and trunk with warmed oil or other similar preparation.

DO Keep the child at home until the worst of the cold is over and so protect him from complications as well as reducing the risk of infecting others.

DON'T Force food on the child. As long as he has plenty of drinks and fruit juices he will probably be better without too much solid food.

DON'T Keep a child with a cold cooped up in stuffy rooms. Let him be outside if the weather is sunny and not too windy, and if inside see that the room is well ventilated. Remember that fresh air and sunshine are the best germ killers known.

DON'T Allow the crawling baby on the floor for a few days—he may become chilled.

DON'T Neglect to provide interesting and constructive toys for the sick child. It takes his mind off his discomfort.

DON'T Let a cold go on indefinitely without seeking your doctor's advice, especially if there is a cough or any difficulty in breathing. If the child is feverish or drowsy or if there are any signs of ear trouble send for your doctor without delay. Many serious illnesses developing out of common colds could be prevented if taken in time.

DON'T Wait till late at night before ringing your doctor.

Questions on this or any other matter concerning Maternal and Child Welfare will be answered by communicating personally with *The Maternal and Child Welfare Information Bureau*, 184 St. Paul's Terrace, Brisbane, or by addressing letters "*Baby Clinic, Brisbane.*" These letters need not be stamped.

IN THE FARM KITCHEN.

The Ever Useful Tomato.

In the present circumstances, recommendations are subject, of course, to the availability of the ingredients mentioned or of suitable substitutes.

Some Ways of Using Tomatoes—

Tomato Forcemeat.

Ingredients:—1 cupful tomato pulp, 1 oz. butter, 2 teaspoons finely chopped onion, 1 cup breadcrumbs, 1 egg. *Method*:—Season with pepper and salt, melt butter in saucepan, cook the onion in it without browning, add tomato pulp, cook together for 8 or 10 minutes, then allow to cool. Mix in the breadcrumbs and egg and add seasoning.

Tomato Gravy (for serving with cutlets, rissoles, or sausages).

Heat 1 tablespoon of butter in a saucepan with a little flour (about 1 dessert spoonful), brown it, stirring well so as to prevent burning, then add 1 cupful of strained tomato pulp, continue to stir until the mixture boils and is of a smooth consistency.

Sliced Tomatoes Baked.

Ingredients:—1 bottle of sliced tomatoes, breadcrumbs, mustard, pepper and salt, butter. *Method*:—Open a bottle of sliced tomatoes and drain them well. Brush each slice lightly with a little mustard which has been moistened with the tomato liquid. Season the breadcrumbs with pepper and salt and sprinkle the slices well; put them in a baking dish with small pieces of butter dotted over the surface, and bake till heated through and nicely browned. Serve very hot. Bottled whole tomatoes may be used if desired.

Fried Tomato Slices.

Ingredients:—1 bottle sliced tomatoes or fresh tomato slices, 1 egg, 1 teaspoonful of tomato liquid, pepper and salt, breadcrumbs, little plain flour, frying dripping. *Method*:—Drain the slices thoroughly, and dredge each one with a little plain flour; mix the teaspoon of tomato liquid with the egg and dip the slices quickly into it, then into the crumbs, coating them entirely; fry at once in very hot dripping or butter until nicely browned, then lift out carefully and place them to drain on kitchen paper; then transfer them to a hot dish and garnish with a little parsley. Tomatoes treated in this manner are nice for serving with fried bacon, fish, or cutlets.

Tomato Au Gratin.

Ingredients.—I quart bottle of tomato slices or tomato pulp strained, 2 cups breadcrumbs, 2 tablespoonfuls of grated cheese, 1 tablespoonful of butter, salt and pepper. *Method*:—Put a layer of tomato slices, or tomato pulp, on the bottom of a fireproof dish; season with salt and pepper; then put a layer of breadcrumbs and a sprinkling of grated cheese. Repeat in alternate layers until all is used up. Place the butter in small pieces about the top and bake in a moderate oven. If preferred, a little grated onion and finely-chopped parsley may be mixed with the tomatoes and the cheese omitted.

Green Tomato Pickle.

Ingredients:—6 lb. green tomatoes, 2 lb. onion (sliced), ¼ lb. mustard, 2 quarts vinegar, 3 oz. whole ginger, ¾ lb. sugar, 1 tablespoon cloves, 2 rounded tablespoons flour, 1 rounded teaspoon tumeric. *Method*:—Slice the tomatoes and onions, and sprinkle moderately with salt, place a plate on top and allow to remain overnight. Next day, drain the water which the salt has extracted, and put the vegetables into a preserving pan with the vinegar, sugar, and spices (the latter tied in a muslin bag); simmer together for about 20 minutes, and then remove the spice bag. Mix the mustard, tumeric, and flour, with a little cold vinegar, and stir it into the pickles; continue the cooking for 10 minutes or so; then bottle while hot.

Green Tomato Chutney.

Ingredients:—12 lb. green tomatoes, 2 lb. onions, 3 lb. sugar, 1½ oz. ginger, ½ oz. cloves, ½ oz. wholespice, ½ oz. peppercorns, 1 teaspoonful mustard, 2 quarts vinegar. *Method*:—Cut the tomatoes into about four sections, sprinkle with salt, and allow to remain 24 hours or so, then drain off the water which the salt has drawn. Meanwhile, spice and sweeten the vinegar, and put the drained tomatoes and onions into it, cooking until well blended.

JULY WEATHER IN QUEENSLAND.

Over average district rainfall figures in most Divisions were mainly due to a State-wide rain distribution, under out-of-season monsoonal influences, during the second week. Other rains were mostly confined to the usual scattered showers along the coastal fringe and some other useful shower periods which consolidated and enhanced the earlier recovery in agricultural and dairying seasonal prospects throughout the Downs and South Coastal Divisions. In the Carpentaria Divisions totals of 1½ to approximately 3 inches were heavy enough to be useful, but rains in sections of the central Lowlands, Highlands and Central Coast, as well as a narrow strip along the border Hebel to Wallangarra, were under average. Most of the Central and North Coast areas have also been dry since February and March. In the dry to drought areas of the Warrego and Maranoa the mid-month rains aggregated approximately 1½ to 2 inches, temporarily useful, but in general hardly sufficient to promote much pasture growth with intervening spells of cold weather. Additional early rains and milder temperatures are required to re-establish normal spring conditions.

Temperatures.—Average maximum temperatures were 2 to 3 degrees below in the Tropical Interior, otherwise ranged from normal to 2 degrees above, 3 degrees at Thargomindah. Minimum temperatures ranged from normal to 2 and 3 degrees above, up to 4 degrees at Mitchell and Stanthorpe despite some sharp frost periods in the central and southern sections of the State.

The rain position is summarised below:—

Division.	Normal Mean.	Mean July, 1944.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	42	156	271 above
Peninsula South	24	207	763 ,,
Lower Carpentaria	20	238	1,090 ,,
Upper Carpentaria	42	167	298 ,,
North Coast, Barron	114	239	110 ,,
North Coast, Herbert	179	285	59 ,,
Central Coast, East	111	121	9 ,,
Central Coast, West	65	123	89 ,,
Central Highlands	116	102	12 below
Central Lowlands	82	83	1 above
Upper Western	41	133	224 ,,
Lower Western	51	88	73 ,,
South Coast, Port Curtis	178	207	16 ,,
South Coast, Moreton	227	475	109 ,,
Darling Downs East	181	249	38 ,,
Darling Downs West	141	204	45 ,,
Maranoa	147	199	35 ,,
Warrego	107	152	42 ,,
Far South-West	69	80	16 ,,

Commonwealth Meteorological Bureau, Brisbane.

ASTRONOMICAL DATA.

STANDARD TIMES FOR BRISBANE.

Date, 1944.	Sunrise.	Sunset.	Moonrise.	Moonset.	Date, 1944.	Sunrise.	Sunset.	Moonrise.	Moonset.
Aug.	a.m.	p.m.	p.m.	a.m.	Aug.	a.m.	p.m.	a.m.	p.m.
1	6.30	5.18	2.00	3.01	17	6.18	5.26	5.06	3.59
2	6.30	5.18	2.55	4.01	18	6.17	5.27	5.49	4.53
3	6.29	5.19	3.56	5.01	19	6.16	5.27	6.28	5.46
4	6.28	5.19	5.01	5.58	20	6.15	5.28	7.04	6.38
5	6.28	5.20	6.08	6.51	21	6.14	5.28	7.38	7.29
6	6.27	5.21	7.16	7.41	22	6.14	5.29	8.10	8.20
7	6.26	5.21	8.23	8.26	23	6.13	5.29	8.42	9.12
8	6.26	5.22	9.28	9.08	24	6.12	5.30	9.14	10.03
9	6.25	5.22	10.32	9.48	25	6.11	5.30	9.48	10.56
10	6.24	5.23	11.34	10.28	26	6.10	5.31	10.24	11.51
11	6.23	5.23	..	11.09	27	6.09	5.31	11.04	..
			a.m.						a.m.
12	6.22	5.24	12.35	11.51	28	6.08	5.31	11.49	12.48
			p.m.					p.m.	
13	6.22	5.24	1.34	12.36	29	6.07	5.32	12.39	1.46
14	6.21	5.25	2.32	1.23	30	6.05	5.32	1.36	2.44
15	6.20	5.25	3.27	2.13	31	6.04	5.33	2.39	3.41
16	6.19	5.26	4.18	3.06					

PHASES OF THE MOON.

Full Moon	Aug. 4th	10.39 p.m.	New Moon	Aug. 19th	6.25 a.m.
Last Quarter	Aug. 11th	12.52 p.m.	First Quarter	Aug. 27th	9.39 a.m.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

JUNE RAINFALL.

(Compiled from Telegraphic Reports).

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	June.	No. of years' records.	June, 1944.	June, 1943.		June.	No. of years' records.	June, 1944.	June, 1943.
North Coast.	In.		In.	In.	*South Coast—contd.*	In.		In.	In.
Atherton	1·71	43	4·19	1·06	Gatton College ..	1·72	44	0·62	1·00
Cairns	2·86	62	5·22	0·98	Gayndah	1·82	73	0·46	1·61
Cardwell	2·07	72	4·05	1·30	Gympie	2·58	74	1·72	1·36
Cooktown	2·06	68	3·42	0·52	Kilkivan	2·12	63	0·85	1·27
Herberton	1·18	58	2·53	0·78	Maryborough ..	2·90	73	2·13	1·26
Ingham	2·46	52	3·44	1·32	Nambour	3·65	48	3·30	1·79
Innisfail	7·41	62	15·73	4·27	Nanango	1·94	62	1·04	1·32
Mossman	2·95	20	4·80	2·61	Rockhampton ..	2·50	73	0·91	1·99
Townsville	1·38	72	0·46	0·99	Woodford	2·75	57	1·72	1·32
Central Coast.					*Central Highlands.*				
Ayr	1·48	57	0·56	1·39	Clermont	1·67	73	0·50	0·91
Bowen	1·65	73	0·94	2·12	Springsure	1·75	75	0·62	0·87
Charters Towers ..	1·29	62	0·42	0·33					
Mackay	2·74	73	2·89	3·40	*Darling Downs.*				
Proserpine	3·22	41	3·26	3·08	Dalby	1·62	74	0·89	0·81
St. Lawrence ..	2·45	73	1·65	1·59	Emu Vale	1·43	48	0·67	0·61
					Jimbour	1·53	65	0·80	1·59
South Coast.					Miles	1·68	59	1·34	0·86
Biggenden	2·15	45	0·55	1·53	Stanthorpe	1·86	71	0·95	0·81
Bundaberg	2·77	61	1·11	1·29	Toowoomba	2·31	72	0·84	0·90
Brisbane	2·60	92	0·90	1·21	Warwick	1·69	79	0·15	0·77
Caboolture	2·72	68	2·27	1·26					
Childers	2·39	49	0·92	1·96	*Maranoa.*				
Crohamhurst	4·29	50	2·67	1·87	St. George	1·48	63	0·85	1·14
Esk	2·12	57	0·52	1·51	Roma	1·49	70	1·47	1·36

CLIMATOLOGICAL TABLE FOR JUNE, 1944.

Compiled from Telegraphic Reports.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cairns	..	76	68	79	9, 15, 16	57	20	522	19
Herberton	..	67	52	72	11, 12	35	20	253	16
Townsville	..	77	60	81	11	44	20	46	5
Brisbane	30·18	69	51	74·6	4	41·4	22	90	7
Darling Downs.									
Dalby	..	67	40	75	9	27	22	89	3
Stanthorpe	..	60	33	68	10	19	21	95	4
Toowoomba	..	61	44	65	8, 10, 16	37	20, 21, 29	84	7
Mid-Interior.									
Georgetown	30·02	81	..	89	21	..	..	32	2
Longreach	30·23	75	49	82	24	38	20	1	1
Mitchell	30·30	67	39	75	10	25	22	89	4
Western.									
Burketown	..	81	60	86	6, 14	51	19, 22	197	5
Boulia	30·15	73	47	82	6	38	23	Nil	..
Thargomindah	30·27	67	45	77	7	37	19, 20	7	2

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